144/220 MHz, 144/430 MHz FM MULTI BANDER

TM-641A
TM-741A/E

SERVICE MANUAL

KENWOOD

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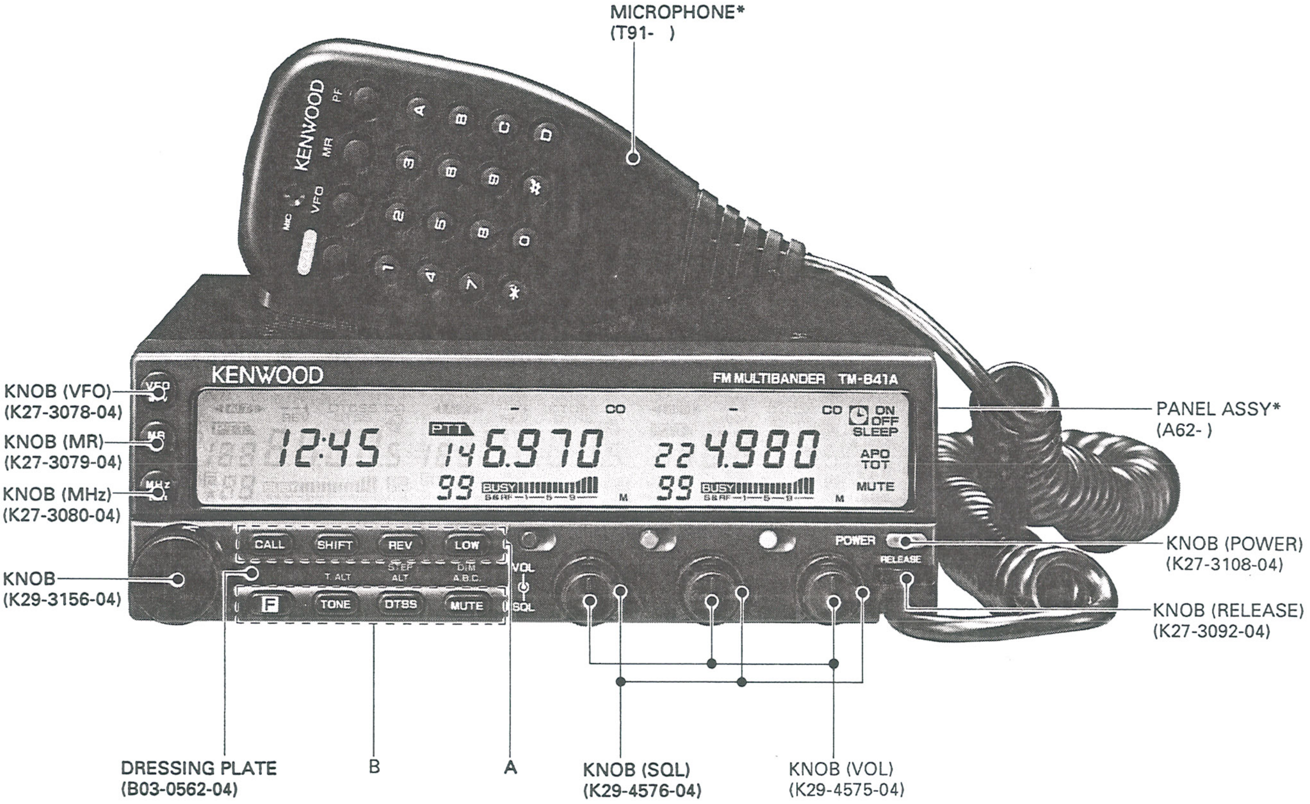
MICROPHONE*
(T91-)
KNOB (VFO)
(K27-3078-04)
KNOB (MR)
(K27-3079-04)
KNOB (MHz)
(K27-3080-04)
KNOB
(K29-3156-04)
PANEL ASSY*
(A62-)
KNOB (POWER)
(K27-3108-04)
KNOB (RELEASE)
(K27-3092-04)
DRESSING PLATE
(B03-0562-04)
B
A
KNOB (SQL)
(K29-4576-04)
KNOB (VOL)
(K29-4575-04)
KENWOOD
FM MULTIBANDER TM-641A
CALL
SHIFT
REV
LOW
F
TONE
DTSS
MUTE
VOL
SQL
POWER
RELEASE

A	KNOB (CALL) K27-3110-04	KNOB (SHIFT) K27-3118-04	KNOB(REV) K27-3114-04	KNOB(LOW) K27-3116-04
B	KNOB (F) K27-3111-04	KNOB (TONE) K27-3113-04	KNOB (DTSS) K27-3115-04	KNOB (MUTE) K27-3117-04

*** Refer to parts list on page 62**
Photo is TM-641A

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TM-641A/741A/741E

OVERVIEW

List of Destinations

Model	Destination	Destination code
TM-641A	North America	K
TM-741A	North America	K
TM-741A	Canada	P
TM-741E	Europe	E
TM-741A	Other countries	M
TM-741A	Other countries	M2

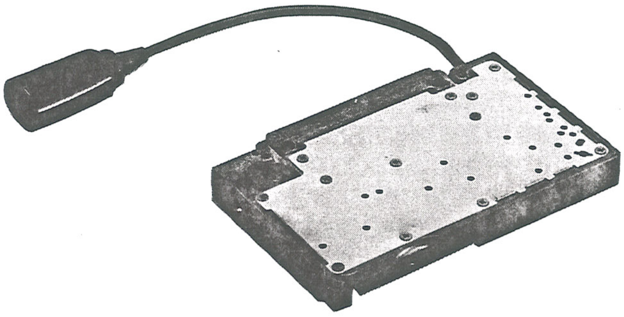
Units for Each Model and Destination

Parts No.	Unit name	TM-741A/E					TM-641A	Band Units				
								UT-28S	UT-50S	UT-220S	UT-440S	UT-1200
		K	P	E	M	M2	K	M	M	K	K	M
X53-3310-12	Control unit	I	I		I	I	I					
X53-3312-71	Control unit			I								
X54-3120-11	Display unit	I	I				I					
X54-3120-21	Display unit				I							
X54-3120-22	Display unit						I					
X54-3122-71	Display unit			I								
X57-3580-12	144 TX-RX unit	I	I	I	I	I	I					
X57-3590-12	440 TX-RX unit	I	I								I	
X57-3590-22	430 TX-RX unit				I	I						
X57-3592-72	430 TX-RX unit			I								
X57-3600-11	1200 TX-RX unit											I
X57-3790-01	28 TX-RX unit							I				
X57-3800-01	50 TX-RX unit								I			
X57-3810-10	220 TX-RX unit						I			I		

BAND UNITS

Any of the following optional band units may be installed in the TM-641A/741A/741E.
The same instructions apply for the Tri-Bander as for the Dual-bander.

	OPTIONAL BAND UNIT			
TM-641A U.S.A. version	UT-28S	UT-50S	UT-440S	UT-1200
TM-741A U.S.A. version	UT-28S	UT-50S	UT-220S	UT-1200
TM-741A	UT-28S	UT-50S	UT-1200	
TM-741E	UT-28S	UT-50S	UT-1200	



CIRCUIT DESCRIPTION

UT-28

28 TX-RX Unit Frequency Configuration

The 28 MHz unit incorporates a variable frequency oscillator (VFO), based on a phase-locked-loop (PLL) synthesizer system, that allows a channel step of 5, 10, 15, 20, or 25 kHz to be selected. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 36.83-38.525 MHz to produce a first intermediate frequency (IF) of 8.83 MHz.

This frequency is then mixed with a second local oscillation frequency of 9.285 MHz to produce a second IF of 455 kHz. This is called a double-conversion system. The signal in the transmission channel is produced by direct oscillation, is frequency-divided by a PLL circuit, amplified by a linear amplifier, then transmitted.

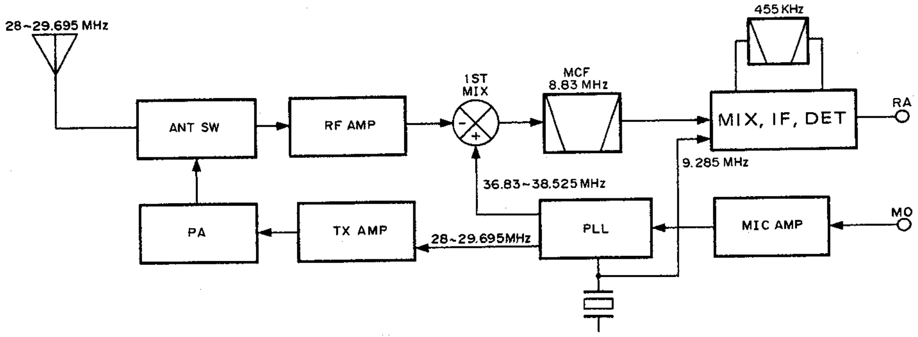


Fig. 1 Frequency configuration

28 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal from the antenna passes through a low-pass filter in the final transmission stage and then through a transmission/reception selection diode switch to the receiving front end. The signal then passes through an antenna matching coil and is amplified to high frequencies by a MOS field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resulting signal goes to the first mixer, is mixed with the first local signal from the PLL circuit, then converted to the first IF of 8.83 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first IF signal is amplified and input to FM IF HIC IC6 (KCD04). This signal is then mixed with the second local oscillation frequency of 9.285 MHz to produce the second IF signal of 455 kHz. The unwanted near-by signal components are then eliminated by an FM ceramic filter. The resulting signal is input to IC6 again, amplified to the second IF signal, and detected to produce an audio signal.

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC6 (KCD04) is supplied to the control unit.

Item	Rating
Center frequency (fo)	8830 kHz
Pass bandwidth	± 6 kHz or more at 3 dB
Attenuation bandwidth	± 20 kHz or less at 40 dB ±40 kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within Fo ± 1 MHz (Spurious: 40 dB or more)
Ripple	1 dB or less
Insertion loss	2 dB or less
Terminating impedance	4.7 kΩ//0pF

Table 1 MCF (L71-0422-05) (28TX-RX unit XF1)

Item	Rating
Nominal center frequency	455KHz
6 dB bandwidth	± 6 kHz or more (from 455 kHz)
50 dB bandwidth	± 12.5 kHz or less (from 455 kHz)
Ripple (within ± 5 kHz of 455 kHz	3 dB or less
Insertion loss (at maximum output point)	6 dB or less
Guaranteed attenuation (within ± 100 kHz of 455 kHz)	35 dB or more
I/O matcing impedance	2.0kΩ

Table 2 Ceramic filter CFWM455F (L72-0372-05) (28TX-RX unit CF1)

CIRCUIT DESCRIPTION

- **Shift-register circuit**
  The ES, CK, and DT serial data from the control unit are sent to C1 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Qs	
2	Data	Serial data input	10	Q's	
3	Clock	Clock input	11	Q8	TX/RX selection. High when TX is set.
4	Q1	TX/RX selection. Low when TX is set	12	Q7	ATT switching: High when ATT is on
5	Q2	TX power selection. Low when middle and low. "H" when high.	13	Q6	High for AM; low for FM; High for narrow; low for wide
6	Q3	TX power selection. Low when high and low. "H" when middle.	14	Q5	High when off band
7	Q4	Low when off band	15	OE	8V
8	Vss	GND	16	VDD	8V

Table 3

- **ATT circuit**
  If there is cross modulation, the ATT circuit operates to attenuate the received signal before it enters Q2 (FET for high-frequency amplification).

28 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is produced by direct oscillation, and is directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC3 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminates unwanted high-frequency components. The voltage-controlled oscillator (VFO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC16 (KCB16). The amplifier can obtain a stable drive output without adjustment because it has a large bandwidth. An APC circuit controls the collector voltage in the Younger final stage.

- **Power amplifier circuit**

The drive signal is amplified to the specified level by a discrete transistor. Q2 performs class B amplification, and the collector output voltage is controlled by an APC circuit. Q202 amplifies the power by class C operation, improving the efficiency of the final stage.

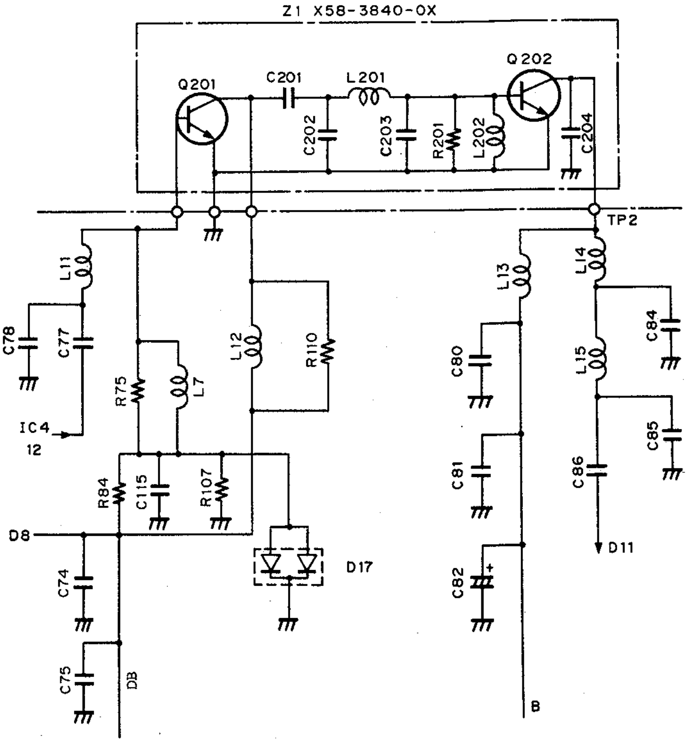


Fig. 2 Power amplifier circuit

CIRCUIT DESCRIPTION

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power amplifier output with a diode, and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the radio against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch if it exceeds the specified temperature.

- **8T (8 V during transmission) and unlock signal**

The signal output from pin 4 of IC1 is high during reception, Q13 is turned on, and Q14 and Q11 are turned off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then made low. Therefore, Q13 is turned off, and 14 and Q11 are turned on. An 8 V voltage is applied to the collector (8T) of Q11.

If the PLL circuit is unlocked during transmission, the LD pin goes low, Q24 is turned off, Q13 is turned on, Q14 is turned off, Q11 for 8T switching control is turned off, and the 8T line does not operate.

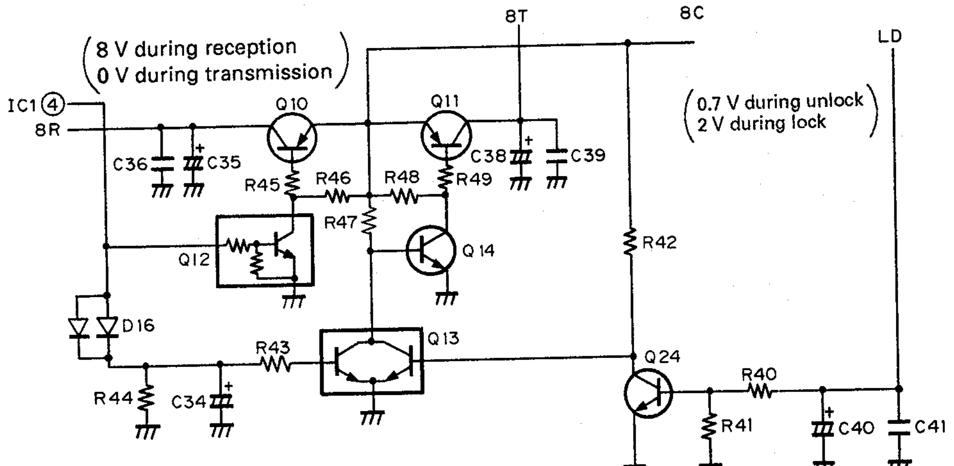

8T
8C
LD
8 V during reception
0 V during transmission
IC1④
8R
Q10
Q11
0.7 V during unlock
2 V during lock
C36
C35
R45
R46
R48
R49
C38
C39
R47
Q12
Q14
R42
D16
Q13
R43
Q24
R40
R44
C34
R41
C40
C41

Fig. 3

28 TX-RX Unit PLL Synthesizer

The VCO and PLL circuits are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies are produced by dividing a 9.285 MHz reference oscillation frequency by 1857 to correspond to the 5, 10, 15, 20, and 25 kHz channel steps.

For 28 MHz, the relationship between f_{vco} (RX) and each frequency division ratio is given by

$f_{vco} = (28+8.83) = \{(n \times 64)+A\} \times f_{osc}/R$

Where: f_{vco}=VCO output frequency

n: Binary 10-bit programmable counter setting value

A: Binary 6-bit programmable counter setting value

f_{osc}: Reference oscillation frequency of 9.285 MHz

R: Binary 16-bit programmable counter setting value 1857

In this case, n is 155, and A is 6.

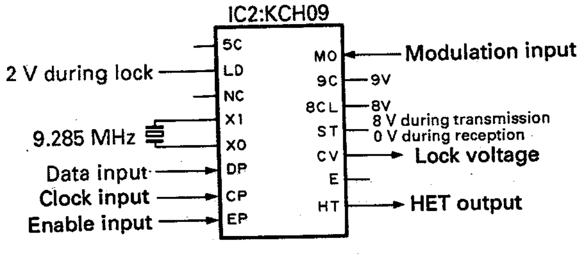

IC2:KCH09
5C
LD
NC
XI
XO
DP
CP
EP
MO
9C
8CL
ST
CV
E
HT
2 V during lock
9.285 MHz
Data input
Clock input
Enable input
Modulation input
9V
8V
8 V during transmission
0 V during reception
Lock voltage
HET output

Fig. 4

Therefore, $f_{vco} = \{(115 \times 64)+6\} \times 9285/1857$

$= (7360+6) \times 5$

$= 36.83$ MHz

The following table lists the pin functions of the PLL circuit:

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (2 V during locking)	9c	9v
NC	Unused	8CL	8 V (ripple filter)
XI XO	9.285 MHz crystal oscillation	ST	8 V during transmission; 0 V during reception
		CV	Lock voltage output
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 4 PLL circuit pin functions

CIRCUIT DESCRIPTION

UT-50

50 TX-RX Unit Frequency Configuration

The 50 MHz unit incorporates a variable frequency oscillator (VFO), based on a phase-locked-loop (PLL) synthesizer system, that allows a channel step of 5, 10, 15, 20, or 25 kHz to be selected. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 60.595-64.590 MHz to produce a first intermediate frequency (IF) of 10.595 MHz. This frequency is then mixed with a second local oscillation frequency of 11.05 MHz to produce a second IF of 455 kHz. This is called a double-conversion system. The signal in the transmission channel is produced by direct oscillation, and is frequency-divided by a PLL circuit, amplified by a linear amplifier, then transmitted.

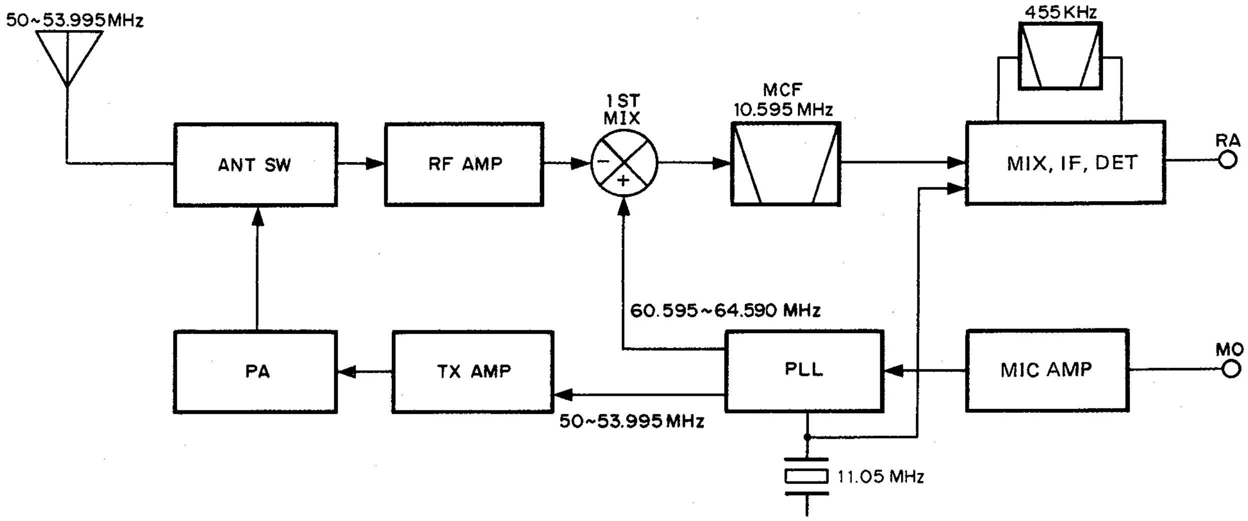


Fig. 5 Frequency Configuration

50 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal by the antenna passes through a low-pass filter in the final transmission stage and then through a transmission/reception selection diode switch to the receiving front end. The signal then passes through an antenna matching coil and is amplified to high frequencies by a GaAs (gallium arsenide) field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resulting signal goes to the first mixer, is mixed with the first local signal from the PLL circuit, then converted to the first IF of 10.595 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first IF signal is amplified and input to FM IF HIC IC6 (KCD04). This signal is then mixed with the second local oscillation frequency of 11.05 MHz to produce the second IF signal of 455 kHz. The unwanted near-by signal components are then eliminated by an FM ceramic filter. The resulting signal is input to IC6 again, amplified to the second IF signal, and detected to produce an audio signal.

Item	Rating
Center frequency	10.595 MHz
Pass bandwidth	±6.5 kHz or more at 3 dB
Attenuation bandwidth	±23 kHz or less at 40 dB ±40 kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within Fo ±1 MHz (Spurious: 40 dB or more)
Ripple	1 dB or less
Insertion loss	1.5 dB or less
Terminating impedance	2.9 kΩ//0pF

Table 5 MCF (L71-0421-05) (50TX-RX unit XF1)

Item	Rating
Nominal center frequency	455KHz
6 dB bandwidth	±6.0 kHz or more (from 455 kHz)
50 dB bandwidth	±12.5 kHz or less (from 455 kHz)
Ripple (within ±5 kHz of 3455 kHz)	3 dB or less
Insertion loss (at maximum output point)	6 dB or less
Guaranteed attenuation (within ±100 kHz of 455 kHz)	35 dB or more
Terminating impedance	2.0 kΩ

Table 6 Ceramic filter CFWM455F (L72-0372-05) (50TX-RX unit CF1)

CIRCUIT DESCRIPTION

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC6 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The ES, CK, and DT serial data from the control unit are sent to IC1 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Qs	
2	Data	Serial data input	10	Q's	
3	Clock	Clock input	11	Q8	TX/RX selection. High when TX is set.
4	Q1	TX/RX selection. Low when TX is set	12	Q7	ATT switching: High when ATT is on
5	Q2	TX power selection. Low when middle and low. "H" when high.	13	Q6	High for AM; low for FM
6	Q3	TX power selection. Low when high and low. "H" when middle.	14	Q5	High when off band
7	Q4	Low when off band	15	OE	8V
8	Vss	GND	16	VDD	8V

Table 7

- **ATT circuit**

If there is cross modulation, the ATT circuit operates to attenuate the received signal before it enters Q2 (FET for high-frequency amplification).

50 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is produced by direct oscillation, and is directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC3 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminates unwanted high-frequency components. The voltage-controlled oscillator (VFO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC4 (KCB18). The amplifier can obtain a stable drive output without adjustment because it has a large bandwidth. An APC circuit controls the collector voltage in the Younger final stage.

- **Power amplifier circuit**

The drive signal is amplified to the specified level by a discrete transistor. Q201 performs class B amplification, and the collector output voltage is controlled by an APC circuit. Q202 amplifies the power by class C operation, improving the efficiency of the final stage.

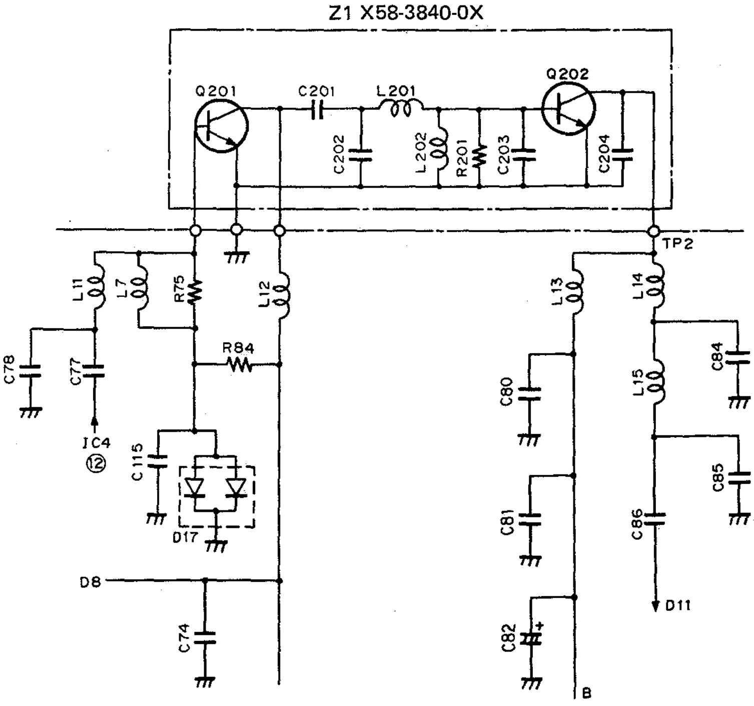


Fig. 6 Power amplifier circuit

CIRCUIT DESCRIPTION

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power amplifier output with a diode, and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the radio against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch if it exceeds the specified temperature.

- **LPF circuit**

The low-pass filter sets the pole to the second and third harmonics, and cuts the frequency, by having the polar Chebyshev characteristics. To cut high frequencies, a filter with Chebyshev characteristics is used before the antenna.

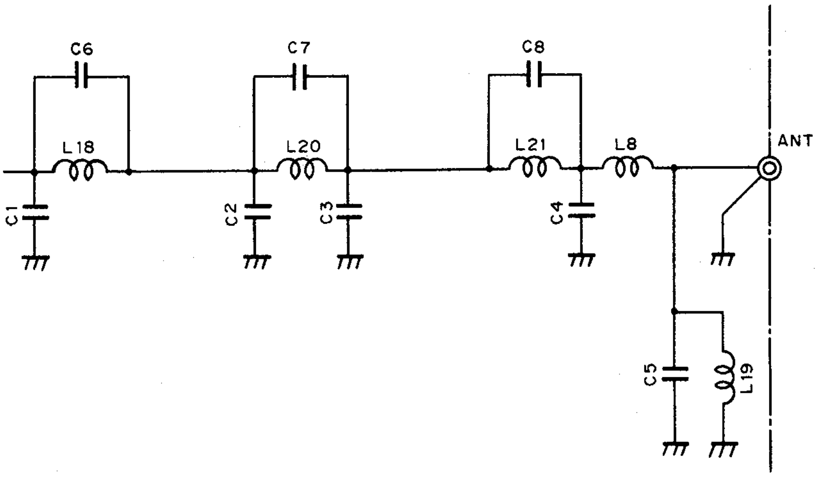

C6
C7
C8
L18
L20
L21
L8
ANT
C1
C2
C3
C4
C5
L19

Fig. 7 LPF Circuit

- **8T (8 V during transmission) and unlock signal**

The signal output from pin 4 of IC1 is high during reception, Q13 is turned on, and Q14 and Q11 are turned off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then made low. Therefore, Q13 is turned off, Q14 and Q11 are turned on. An 8 V voltage is applied to the collector (8T) of Q11.

If the PLL circuit is unlocked during transmission, the LD pin goes low, Q24 is turned off, Q13 is turned on, Q14 is turned off, Q11 for 8T switching control is turned off, and the 8T line does not operate.

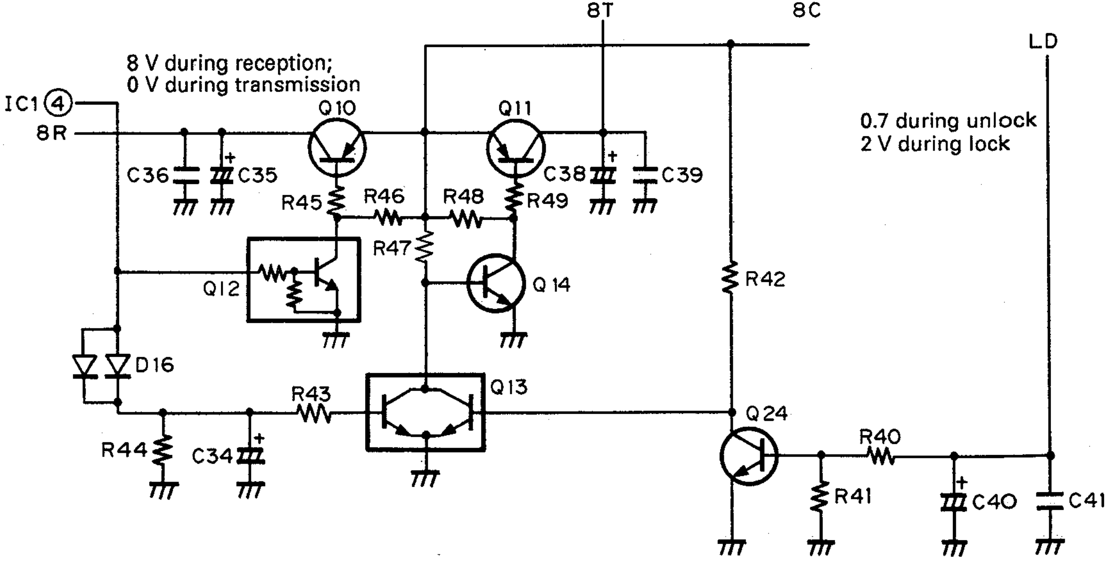

8T
8C
LD
8 V during reception;
0 V during transmission
IC1 ④
8R
Q10
Q11
0.7 during unlock
2 V during lock
C36
C35
C38
C39
R45
R46
R48
R49
R47
Q12
Q14
R42
D16
R43
Q13
Q24
R40
R44
C34
R41
C40
C41

Fig. 8

CIRCUIT DESCRIPTION

- **50 TX-RX Unit PLL Synthesizer**

The VCO and PLL circuits are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies are produced by dividing a 11.05 MHz reference oscillation frequency by 2210 to correspond to the 5, 10, 15, 20, and 25 kHz channel steps.

For 50 MHz, the relationship between f_{VCO} (RX) and each frequency division ratio is given by

$f_{VCO}=(50+10.595)=\{(n\times64)+A\}\times f_{OSC}/R$

Where: f_{VCO}=VCO output frequency

n: Binary 10-bit programmable counter setting value

A: Binary 6-bit programmable counter setting value

f_{OSC}: Reference oscillation frequency of 11.05 MHz

R: Binary 16-bit programmable counter setting value

In this case, n is 189, and A is 23.

Therefore, f_{VCO} $=\{(189\times64)+23\}\times11050/2210$

$=(12096+23)\times5$

$= 60.595$ MHz

The following table lists the pin functions of the PLL circuit:

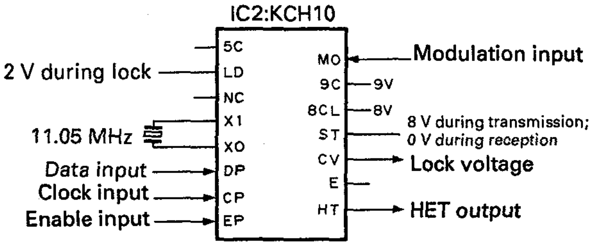

IC2:KCH10
5C
2 V during lock
LD
NC
X1
11.05 MHz
XO
Data input
DP
Clock input
CP
Enable input
EP
MO
Modulation input
9C
9V
8CL
8V
ST
8 V during transmission;
0 V during reception
CV
Lock voltage
E
HT
HET output

Fig. 9

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (2 V during locking)	9C	9V
NC	Unused	8CL	8 V (ripple filter)
XI XO	11.05 MHz crystal oscillation	ST	8 V during transmission; 0 V during reception
	Data input	CV	Lock voltage output
DP	Clock input	E	GND
CP	Enable input	HT	HET output
EP			

Table 8 PLL circuit pin functions

TM-741/UT-144

144 TX-RX Unit Frequency Configuration

The 144 MHz unit incorporates a digital variable-frequency oscillator (VFO) that can freely select a channel step of 5, 10, 12.5, 15, 20, or 25 kHz with a Phase-Locked-Loop (PLL) synthesizer system.

The frequency in the receive signal channel is mixed with a first local oscillation frequency of 133.300-137.295 MHz to produce a first intermediate frequency of 10.7 MHz. This frequency is then mixed with a second local oscillation frequency of 10.245 MHz to produce a second intermediate frequency of 455 kHz. This is called a double-conversion system.

The signal in the transmission channel is directly oscillated and frequency-divided by a PLL circuit, amplified by a straight amplifier, then transmitted.

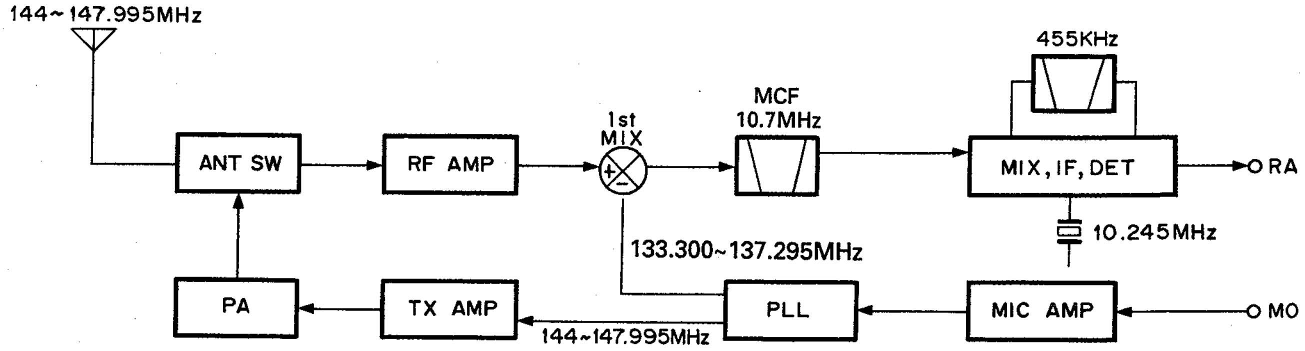


Fig. 10 Frequency configuration

144 TX-RX Unit Receive Signal Channel

- **Outline**

For the 144 MHz unit,the received signal from an antenna is passed through a low-pass filter in the final transmission stage and sent through a transmission/reception selection diode switch to the receiving front end. The signal is then passed through an antenna matching coil and amplified to high frequencies by a GaAs (gallium arsenide) field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resultant signal is sent to the first mixer, mixed with the first local signal from a PLL circuit, then converted to a first intermediate frequency of 10.7 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

Item	Rating
Nominal center frequency (fo)	10.7MHz
Pass band width	±7.5kHz or less at 3dB
Attenuation band width	±25kHz or less at 40dB ±45kHz or less at 60dB
Ripple	1.0dB or less
Insertion loss	1.5dB or less
Guaranteed attenuation	70dB or more within ±1MHz (Spurious : 40dB or more at fo ~ fo + 500kHz) 80dB or more at fo – (900 – 920kHz)
Terminating impedance	3kΩ/0pF

Table 9 MCF (L71-0228-05) (114 TX-RX unit XF1)

Item	Rating
Nominal center frequency	455kHz ± 1kHz
6dB bandwidth	±6kHz or more (from 455kHz)
50dB bandwidth	±12.5kHz or less (from 455kHz)
Ripple (within ±4kHz of 455kHz)	3dB or less
Insertion loss	6dB or less
Guaranteed attenuation (within ±100kHz of 455kHz)	35dB or more
I/O matching impedance	2.0kΩ

Table 10 Ceramic filter CFWM455F (L72-0372-05) (144 TX-RX unit CF1)

CIRCUIT DESCRIPTION

The first intermediate-frequency signal is amplified and input to FM IF HIC IC5 (KCD04). This signal is then mixed with a second local oscillation frequency of 10.245MHz to produce a second intermediate-frequency signal of 455 kHz. The unwanted near-by signal components are then eliminated by an FM ceramic filter. The resultant signal is input to IC5 again, amplified to a second intermediate-frequency signal, and detected to produce an audio signal.

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC5 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The ES, CK, and DT serial data from the control unit are sent to IC1 (BU4094BF) to perform the control operation outlined in the following table:

Pin NO.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Q_s	
2	Data	Serial data input	10	Q'_s	
3	Clock	Clock input	11	Q8	TX/RX selection. "H" when TX is set.
4	Q1	TX/RX selection. "L" when TX is set	12	Q7	439/144 MHz selection. "H" when 144MHz is set.
5	Q2	TX power selection. "L" when middle and low. "H" when high.	13	Q6	
6	Q3	TX power selection. "L" when high and low. "H" when middle.	14	Q5	
7	Q4		15	OE	8V
8	V_{ss}	GND	16	V_{DD}	8V

Table 11

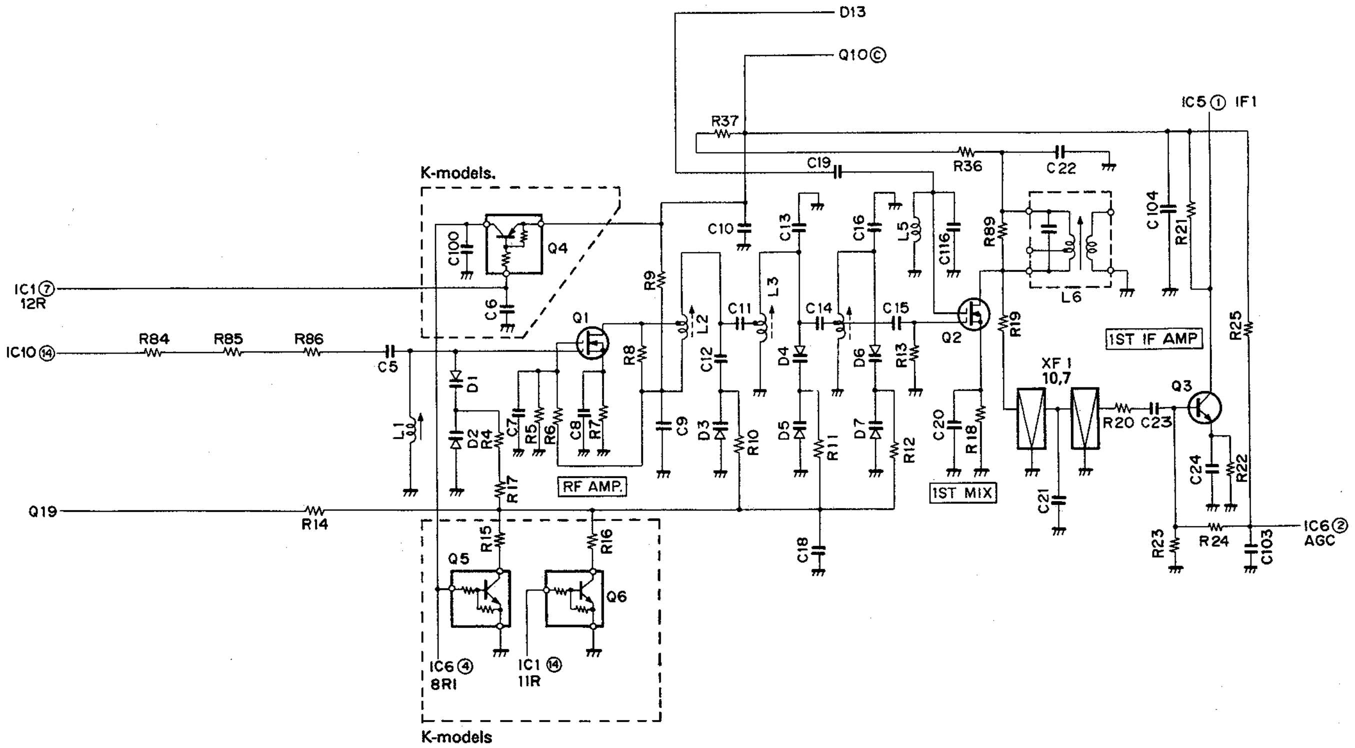

D13
Q10©
IC5① IF1
R37
C19
R36
C22
K-models.
C100
Q4
C10
C13
C16
L5
C116
R89
C104
R21
L6
IC1⑦
12R
C6
R9
L2
C11
L3
C14
C15
Q1
Q2
R19
1ST IF AMP
R25
R84
R85
R86
IC10⑭
C5
R8
C12
D4
D6
R13
XF1
10.7
Q3
L1
D1
D2
R4
C7
R5
R6
C8
R7
C9
D3
R10
D5
R11
D7
R12
C20
R18
R20
C23
C24
R22
RF AMP
1ST MIX
C21
Q19
R14
R17
R15
R16
C18
IC6②
AGC
R23
R24
C103
Q5
Q6
IC6④
8RI
IC1⑭
11R
K-models

Fig. 11

CIRCUIT DESCRIPTION

144 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is directly oscillated and directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC7 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminate unwanted high-frequency components. The voltage-controlled oscillator (VCO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC8 (KCB11). The amplifier can obtain a stable drive output without adjustment because it has a wide band. An APC circuit controls the collector voltage in the younger final stage.

- **Power amplifier circuit**

A drive signal is input to power module IC10 and amplified to the specified level.

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power module output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the set against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch when it exceeds the specified temperature.

144 TX-RX Unit PLL Synthesizer

The VCO and PLL circuit are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies of 6.25 kHz and 5 kHz are produced by dividing a 12.8 MHz reference oscillation frequency by 2048 and 2560 to correspond to 5, 10, 12.5, 15, 20, and 25 kHz channel steps.

For 144 MHz, the relationship between f_{vco} (Rx) and each frequency division ratio is given by

$f_{vco}=(144 - 10.7)= \{(n \times 128) + A\} \times f_{osc} \div R$

Where: f_{vco}= VCO output frequency

n : Binary 10-bit programmable counter setting value

A : Binary 7-bit programmable counter setting value

f_{osc}: Reference oscillation frequency of 12.8 MHz

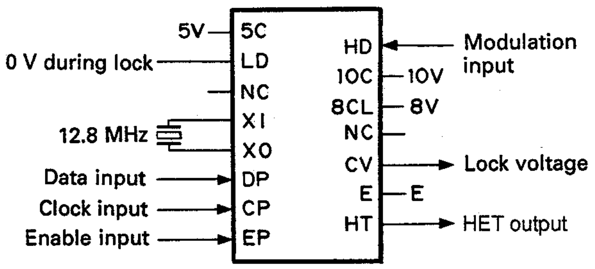


Fig. 12 IC11 KCH05

R: Binary 14-bit programmable counter setting value 2048

In this case, n is 208, and A is 36.

Therefore, $f_{vco}= \{(208 \times 128) + 36\} \times 12800 / 2560$

$= \{26624 + 37\} \times 5$

$= 133300$ kHz = 133.300 MHz

The following table lists the pin functions of the PLL circuit:

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (on during lock)	10C	10V
NC	Unused	8CL	8V (ripple filter)
XI	12.8 MHz crystal oscillation	NC	Unused
XO		CV	Lock voltage output
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 12

- **8T (8 V during transmission) and unlock signal**

A 0.7 V voltage is applied to the base of Q13 during reception, Q13 is set on, Q14 is set off, and Q11 is set off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then set low. Therefore, Q13 is changed from on to off, Q14 from off to on, and Q11 from off to on. An 8 V voltage is applied to the collector (8T) of Q11.

An unlock circuit is activated only during transmission. The LD signal output from the PLL circuit is ORed with the signal at pin 4 of IC1 using D11 as shown in the figure, so the LD signal is set high during unlock. Therefore, no voltage appears at the collector (8T) of Q11 and no transmission wave is output to the reception state.

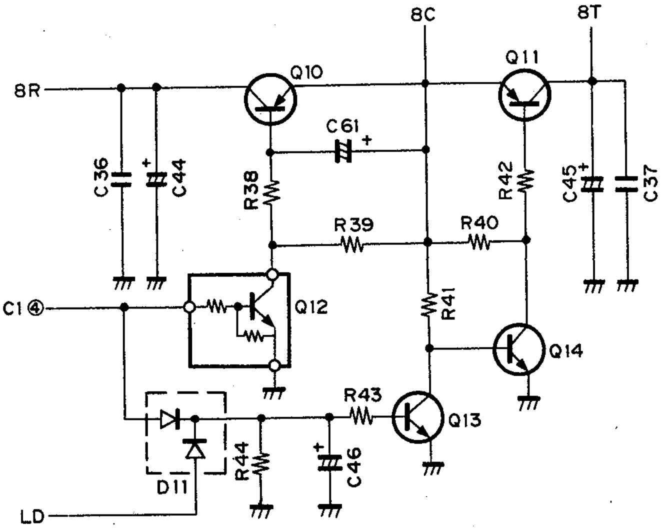

8C
8T
Q10
Q11
8R
C61
C36
C44
R38
R42
C45
C37
R39
R40
IC1④
Q12
R41
Q14
R43
Q13
R44
C46
D11
LD

Fig. 13

UT-220S

220 TX-RX Unit Frequency Configuration

The 220 MHz unit incorporates a variable frequency oscillator (VFO), based on a phase-locked-loop (PLL) synthesizer system, that allows a channel step of 5, 10, 12.5, 15, 20, or 25 kHz to be selected. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 189.175-194.17 MHz to produce a first intermediate frequency (IF) of 30.825 MHz. This frequency is then mixed with a second local oscillation frequency of 30.37 MHz to produce a second IF of 455 kHz. This is called a double-conversion system. The signal in the transmission channel is produced by direct oscillation, and is frequency-divided by a PLL circuit, amplified by a linear amplifier, then transmitted.

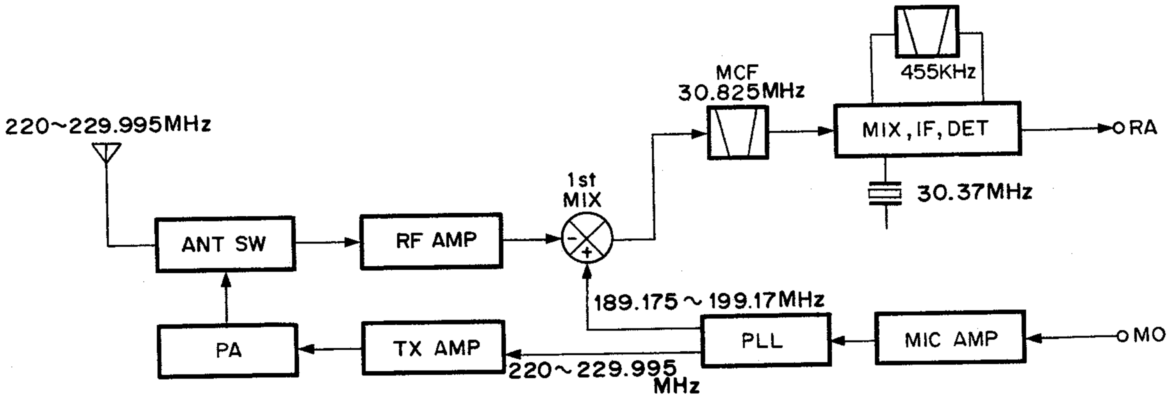

220~229.995MHz
ANT SW
RF AMP
1st MIX
MCF
30.825MHz
455KHz
MIX, IF, DET
RA
30.37MHz
189.175~199.17MHz
PA
TX AMP
PLL
MIC AMP
MO
220~229.995 MHz

Fig. 14 Frequency configuration

220 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal from the antenna passes through a low-pass filter in the final transmission stage and then through a transmission/reception selection diode switch to the receiving front end. The signal then passes through an antenna matching coil and is amplified to high frequencies by a GaAs (gallium arsenide) field-effect transistor. The unwanted components of the signal are eliminated by a bandpass filter consisting of a three-stage variable capacitor. The resulting signal goes to the first mixer (GaAs field-effect transistor), is mixed with the first local signal from the PLL circuit, then converted to a first If of 30.825 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first IF signal is amplified and input to FM IF HIC IC5 (KCD04). This signal is then mixed with the second local oscillation frequency of 30.37 MHz to produce the second IF signal of 455 kHz. The unwanted near-by signal components are then eliminated by an FM ceramic filter. The resulting signal is input to IC5 again, amplified to the second IF signal, and detected to produce an audio signal.

Item	Rating
Center frequency (fo)	30,825 MHz
Pass bandwidth	± 7.5 kHz or more at 3 dB
Attenuation bandwidth	± 28 kHz or less at 40 dB
Guaranteed attenuation	60 dB or more within Fo ± 1 MHz (Spurious: 40 dB or more)
Ripple	1.5 dB or less
Insertion loss	3 dB or less
Terminating impedance	4.7 kΩ//0pF

Table 13 MCF (L71-0420-05) (220 TX-RX unit XF1)

Item	Rating
Nominal center frequency	455KHz
6 dB bandwidth	± 6 kHz or more (from 455 kHz)
50 dB bandwidth	± 12.5 kHz or less (from 455 kHz)
Ripple (within ± 5 kHz of 455 kHz)	3 dB or less
Insertion loss (at maximum output point)	6 dB or less
Guaranteed attenuation (within ± 100 kHz of 455 kHz)	35 dB or more
I/O matcing impedance	2.0kΩ

Table 14 Ceramic filter CFWM455F (L72-0372-05) (220TX-RX unit CF1)

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC5 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The ES, CK, and DT serial data from the control unit are sent toIC1 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function
1	Strobe	Enable input
2	Data	Serial data input
3	Clock	Clock input
4	Q1	TX/RX selection. Low when TX is set.
5	Q2	TX power selection. Low when middle and low. High when high.
6	Q3	TX power selection. Low when high and low. High when middle.
7	Q4	
9	Q3	
10	Q3	
11	Q8	
12	Q7	
13	Q6	
14	Q5	
15	QE	8V

Table 15

CIRCUIT DESCRIPTION

220 TX-RX Unit Transmit Signal Channel

● Outline

In the transmission channel, the desired frequency is produced by direct oscillation, and is directly frequency modulated by means of a varicap diode.

● Modulator circuit

The audio signal from the control unit is input to microphone amplifier HIC IC7 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminates unwanted high-frequency components. The voltage-controlled oscillator (VFO) signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

● Younger-stage circuit

The signal output from the VCO is input to drive circuit HIC IC8 (KCB15). The amplifier can obtain a stable drive output without adjustment because it has a large bandwidth. An APC circuit controls the collector voltage in the Younger final stage.

● Power amplifier circuit

The drive signal is input to power module IC10 and amplified to the specified level.

220 TX-RX Unit PLL Synthesizer

The VCO and PLL circuits are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies are produced by dividing a 12.8 MHz reference oscillation frequency by 2248 and 2560 to correspond to the 5, 10, 12.5, 15, 20, and 25 kHz channel steps.

For 220 MHz, the relationship between f_{vco} (RX) and each frequency division ratio is given by

$f_{vco}=(220+30.825)=\{(n\text{x}128)+A\}\text{x}f_{osc}/R$

Where: f_{vco}=VCO output frequency

n: Binary 10-bit programmable counter setting value

A: Binary 7-bit programmable counter setting value

f_{osc}: Reference oscillation frequency of 12.8 MHz

R: Binary 10-bit programmable counter setting value 2560

In this case, n is 295, and A is 75.

Therefore, f_{vco} $=\{(295\text{x}128)+75\}\text{x}12800/2560$

$=(33760+75)\text{x}5$

$= 189.175$ MHz

The following table lists the pin functions of the PLL circuit:

● APC circuit

The automatic transmission output control circuit (APC) detects and partially amplifies the power amplifier output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant.

● 8T (8 V during transmission) and unlock signal

A 0.7 V voltage is applied to the base of Q13 during reception, Q13 is turned on, and Q14 and Q11 are turned off. No voltage appears at the collector (8T) of Q11. Serial data is output from the control unit during transmission and input to shift register IC1. Pin 4 of IC1 is then made low. Therefore, Q13 is turned off, and Q14 and Q11 are turned on. An 8 V voltage is applied to the collector (8T) of Q11.

The unlock circuit is activated only during transmission. The LD pin signal output from the PLL circuit is ORed with the signal at pin 4 of IC1 using D11, as shown in the figure, so the LD signal is made high during unlock. Therefore, no voltage appears at the collector (8T) of Q11, and no transmission signal is output during reception.

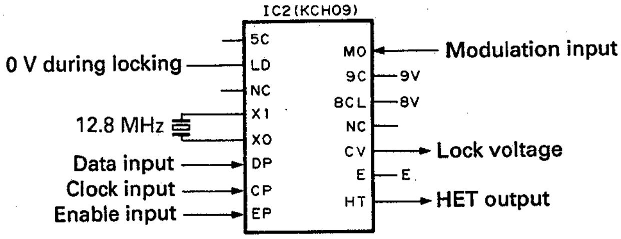


Fig. 15

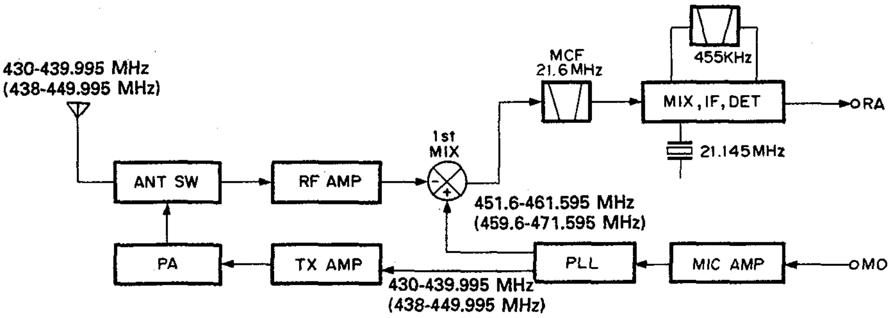
Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (0 V during locking)	9C	9V
NC	Unused	8CL	8 V (ripple filter)
XI XO	12.8 MHz crystal oscillation	NC	
		CV	Lock voltage output
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 16 PLL circuit pin functions

430 TX-RX Unit Frequency Configuration

The 430 MHz unit incorporates a digital variable-frequency oscillator (VFO) that can freely select a channel step of 5, 10, 12.5, 15, 20, or 25 kHz with a PLL synthesizer system. The frequency in the receive signal channel is mixed with a first local oscillation frequency of 451.6-461.595 MHz (459.6-471.595 MHz for K-models) to produce a first intermediate frequency of 21.6 MHz. The frequency is then mixed with a second local oscillation frequency of 21.145 MHz to produce a second intermediate frequency of 455 kHz. This is called a double-conversion system.

The signal in the transmission channel is directly oscillated and frequency-divided by a PLL circuit, amplified by a straight amplifier, then transmitted.



* The alphanumeric characters enclosed in parentheses are used for K-models.

Fig. 16 Frequency Configuration

430 TX-RX Unit Receive Signal Channel

- **Outline**

A 430 MHz band antenna input signal is passed through the antenna selection diode in the final stage and sent through a front-stage antenna matching coil to the high-frequency two-stage amplifier and helical block of a GaAs (gallium arsenide) FET and junction FET. The signal is then input to the first mixer. The first mixer input signal is mixed with the first local signal from the PLL circuit and converted to a first intermediate-frequency signal of 21.6 MHz. The unwanted near-by signal components are then eliminated by a two-stage MCF.

The first intermediate-frequency signal is amplified and input to FM IF HIC IC1 (KCD04). This signal is then mixed with a second local oscillation frequency of 21.145 kHz to produce a second intermediate frequency of 455 kHz. The unwanted near-by components of the intermediate-frequency signal are eliminated by an FM ceramic filter. The intermediate-frequency signal is input to IC1 again. The second intermediate-frequency signal is amplified and detected by IC1 to produce an audio signal.

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC1 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The ES, CK, and DT serial data from the control unit are sent to IC3 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Q_S	
2	Data	Serial data input	10	Q'_S	
3	Clock	Clock input	11	Q8	
4	Q1	TX/RX selection. "L" when TX is set	12	Q7	
5	Q2	TX power selection. "L" when middle and low. "H" when high.	13	Q6	
6	Q3	TX power selection. "L" when high and low. "H" when middle.	14	Q5	
7	Q4		15	OE	8V
8	V_{ss}	GND	16	V_{DD}	8V

Table 17

CIRCUIT DESCRIPTION

430 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is directly oscillated and directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC2 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminate unwanted high-frequency components. The VCO signal is directly frequency modulated by a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to drive circuit HIC IC6 (KCB14). The amplifier can obtain a stable drive output without adjustment because it has a wide band. An APC circuit controls the collector voltage in the younger final stage.

- **Power amplifier circuit**

A drive signal is input to power module IC7 and amplified to the specified level.

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power module output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant. To protect the set against excessive temperature rise, the high-power unit has a thermal switch. The high-power unit is automatically set to a low power by the thermal switch when it exceeds the specified temperature.

430 TX-RX Unit PLL Synthesizer

The VCO and PLL circuit are housed in a solid shielding case as a hybrid integrated circuit. Comparison frequencies of 6.25 and 5 kHz are produced by dividing a 12.8 MHz reference oscillation frequency by 2048 and 2560 to correspond to 5, 10, 12.5, 15, 20, or 25 kHz channel steps.

For 430 MHz, the relationship between f_{vco} (RX) and each frequency division ratio is given by

$f_{vco} = (430 + 21.6) = \{(n \times 128) + A\} \times f_{osc} \div R$

Where: f_{vco} = VCO output frequency

n: Binary 10-bit programmable counter setting value

A: Binary 7-bit programmable counter setting value

f_{osc} = Reference oscillation frequency of 12.8 MHz

R: Binary 14-bit programmable counter setting value

2560 (in 5, 10, 15, and 20 kHz steps)

2048 (in 12.5 and 25 kHz steps)

In 5, 10, 15, and 20 kHz steps, n is 705 and A is 80.

$$\begin{aligned} \text{Therefore, } f_{vco} &= \{705 \times 128\} \times 12800 / 2560 \\ &= \{90240 + 80\} \times 5 \\ &= 451600 \\ &= 451.6 \text{ MHz} \end{aligned}$$

See the 144 MHz band unit (X57-3580-00) for the function of each pin of IC10 in the PLL circuit.

- **8T (8 V during transmission) and unlock signal**

See the 144 TX/RX unit description on page 13. (The figure on the under indicates the 430 MHz unit.)

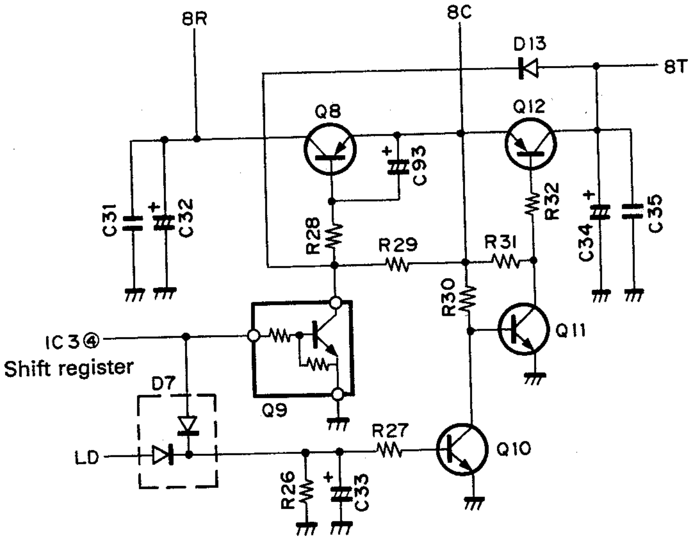


Fig. 17

1200 TX-RX Unit Frequency Configuration

The 1200 MHz unit incorporates a digital variable-frequency oscillator (VFO) that freely can select a channel step of 10, 12.5, 20,or 25 kHz with a PLL synthesizer system.

The frequency in the receive signal channel is mixed with a frequency of 1200.3 to 1240.20 MHz obtained when a first local oscillation frequency of 600.15 to 620.145 MHz is multiplied by 2 to produce a fist intermediate frequency of 59.7 MHz. This frequency is then mixed with a second local oscillation frequency of 59.245 MHz to produce a second intermediate frequency of 455 kHz. This is called a double-conversion system.

The signal in the transmission channel is oscillated and frequency-divided by a PLL circuit,then multiples the frequency of 630 to 649.995 MHz by two to produce a frequency of 1260 to 1299.99 MHz. This signal is amplified by a straight amplifier, then transmitted.

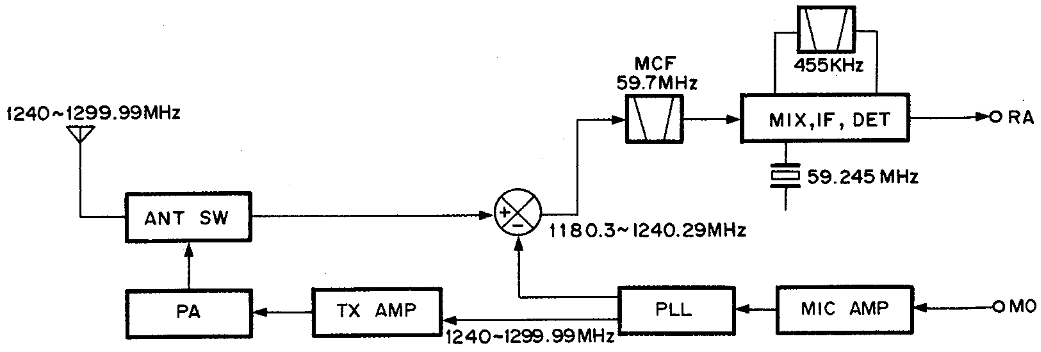


Fig. 18 Frequency Configuration

1200 TX-RX Unit Receive Signal Channel

- **Outline**

The received signal from an antenna is passed through a low-pass filter in the transmission final stage and sent through a transmission/reception selection diode switch to the receiving front end. The signal is then amplified to high frequencies by a microwave GaAs (gallium arsenide) FET and sent to a dielectric filter. The unwanted components of the signal are eliminated by a microwave transistor in another stage and the dielectric filter. The resultant signal is input to the first mixer. The front end block is matched by a microstrip line to ensure high sensitivity and high reliability. A GaAs FET is used in the first mixer to obtain a good two-signal characteristic. This signal is mixed with the first local signal from a PLL circuit by the first mixer and converted to a first intermediate frequency of 59.7 MHz. The unwanted near-by signal components are eliminated by a two-stage MCF. The resultant signal is produced as a first intermediate-frequency signal.

The first intermediate-frequency signal is amplified and input to FM IF HIC IC2 (KCD04). This signal is then mixed with a second local oscillation frequency of 59.245 kHz to produce a second intermediate frequency of 455 kHz. The intermediate-frequency signal is passed through a ceramic filter to obtain a sharp characteristic. The signal is then input to an HIC again, amplified, then demodulated and output from the HIC.

- **Signal-strength meter**

The signal-strength meter output voltage of FM IF HIC IC2 (KCD04) is supplied to the control unit.

- **Shift-register circuit**

The FS, CK, and DT serial data from the control unit are sent to IC5 (BU4094BF) to perform the control operation outlined in the following table:

Pin No.	Name	Function	Pin No.	Name	Function
1	Strobe	Enable input	9	Q_S	
2	Data	Serial data input	10	Q'_S	
3	Clock	Clock input	11	Q8	TX/RX selection. "L" when TX is set (Set low faster than Q1).
4	Q1	TX/RX selection. "L" when TX is set	12	Q7	ALT. "H" when on.
5	Q2	TX power selection. "L" when middle and low. "H" when high.	13	Q6	
6	Q3	TX power selection. "L" when high and low. "H" when middle.	14	Q5	
7	Q4		15	QE	8V
8	V_{ss}	GND	16	V_{DD}	8V

Table 18

1200 TX-RX Unit Transmit Signal Channel

- **Outline**

In the transmission channel, the desired frequency is oscillated by half and directly frequency modulated by means of a varicap diode.

- **Modulator circuit**

The audio signal from the control unit is input to microphone amplifier HIC IC4 (KCA04). IC4 consists of a preemphasis circuit, amplifier, limiter, and splatter circuit that eliminate unwanted high-frequency components. The VCO signal is directly frequency modulated by means of a varicap diode in the frequency modulator circuit.

- **Younger-stage circuit**

The signal output from the VCO is input to predrive circuit IC7 (KCB09). The amplifier can obtain a stable drive output without adjustment because it has a wide band.

- **Power amplifier circuit**

The signal amplified in the predrive stage is amplified again by drive circuit HIC IC8 (KCB10), then input to power module IC10 and amplified to the specified level.

- **APC circuit**

The automatic transmission output control circuit (APC) detects and partially amplifies the power module output with a diode and controls the output control voltage. The control voltage is output in inverse proportion to the output, so the control voltage output is always constant.

- **Antenna selection circuit**

Figure 19 shows the antenna selection circuit. The receiver circuit obtains a low insertion loss and isolation with a two-stage breaker circuit consisting of a λ/4 strip circuit.

The pin diode used as a switching device has a low junction capacitance. The high-frequency capacitance of the diode does not depend on the reverse bias voltage.

Figure 20 shows the equivalent circuit during transmission. A current flows through each diode using 8T. The impedance becomes very low. At that time, the receiver side uses a λ/4 strip circuit. Therefore, the impedance becomes very high when the receiver side is viewed from point (A). The voltage from a power module is transferred to the antenna.

Figure 21 shows the equivalent circuit during reception. The bias is switched off, so each diode is in a high-resistance state. The antenna and receiving circuit are connected by a strip line.

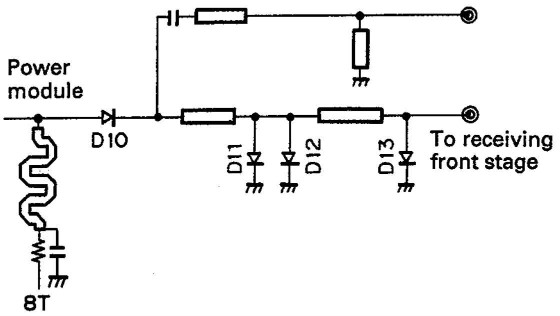

Power module
D10
D11
D12
D13
To receiving front stage
8T

Fig. 19 Antenna Selection Circuit

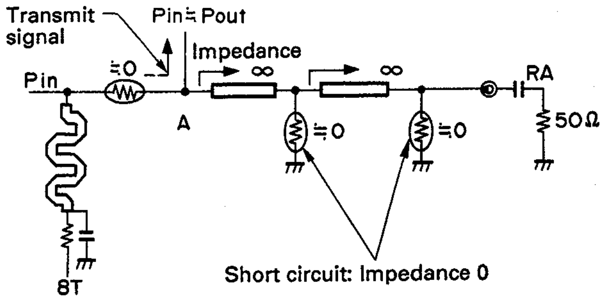

Transmit signal
Pin≒Pout
Impedance
Pin
≒0
∞
∞
A
≒0
≒0
RA
50Ω
8T
Short circuit: Impedance 0

Fig. 20 Equivalent Circuit during Transmission

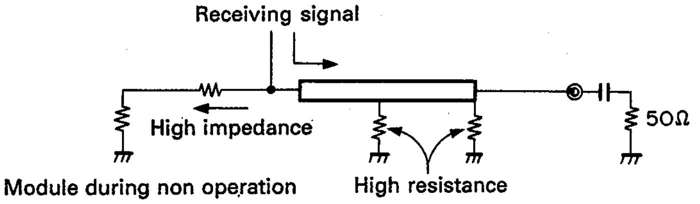

Receiving signal
High impedance
50Ω
Module during non operation
High resistance

Fig. 21 Equivalent Circuit during Reception

1200 TX-RX Unit PLL Synthesizer

The VCO and PLL circuit are housed in 2 solid shielding case as a hybrid integrated circuit. This reduces the electrical and mechanical influence and ensures frequency stability.

The VCO and PLL circuit double the higher harmonics by oscillating and locking a 600 MHz frequency to produce a 1200 MHz band frequency. Comparison frequencies of 5 kHz and 6.25 kHz are produced by dividing a 12.8 MHz frequency of the TCXD by 2560 and 2048 to correspond to 10, 12.5, 20, and 25 kHz channel steps.

The relationship between f_{VCO} (RX) and each frequency division is given by

$$f_{VCO}\,(RX) = (f_{RX} - 59.7) / 2 = \{(n \times 128) + A\} \times f_{OSC} \div R$$

Where: f_{VCO} (RX) = Previous output frequency that is multiplied by 2 during VCO reception

f_{RX}: Reception frequency

n : Binary 10-bit programmable counter setting value

A : Binary 7-bit programmable counter setting value

f_{OSC}: Reference oscillation frequency of 12.8 MHz (TXCO)

R : Binary 14-bit programmable reference counter setting value

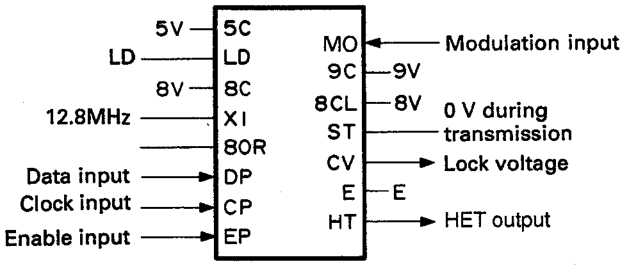
2048 (in 12.5 and 25 kHz steps)

2560 (in 10 and 20 kHz steps)

For 1260 MHz,

$$\begin{aligned} f_{VCO}(RX) &= (1260 - 59.7) \\ &= \{(n \times 180) + A\} \times 12800 \div 2560 \\ &= 600.15 \text{ MHz} \end{aligned}$$

In this case, n is 937 and A is 94.


5V
5C
LD
LD
8V
8C
12.8MHz
XI
8OR
Data input
DP
Clock input
CP
Enable input
EP
MO
Modulation input
9C
9V
8CL
8V
ST
0 V during transmission
CV
Lock voltage
E
E
HT
HET output

The same as for the 144 MHz unit except 8 V shown in the figure above.

Fig. 22 PLL pin description

Pin name	Function	Pin name	Function
5C	5V	MO	Modulation signal input
LD	Lock signal (on during lock)	9C	9V
NC	Unused	8CL	8V (ripple filter)
XI	12.8 MHz crystal oscillation	ST	0 V during transmission
80R		CV	Lock voltage
DP	Data input	E	GND
CP	Clock input	HT	HET output
EP	Enable input		

Table 19

CIRCUIT DESCRIPTION

- **Unlock circuit**

When a PLL circuit is unlocked during transmission, the LD pin of a IC11 set low and Q12 is set off. Q11 is then set on. The 8T line is not activated when 8T switching control circuit Q13 is set off.

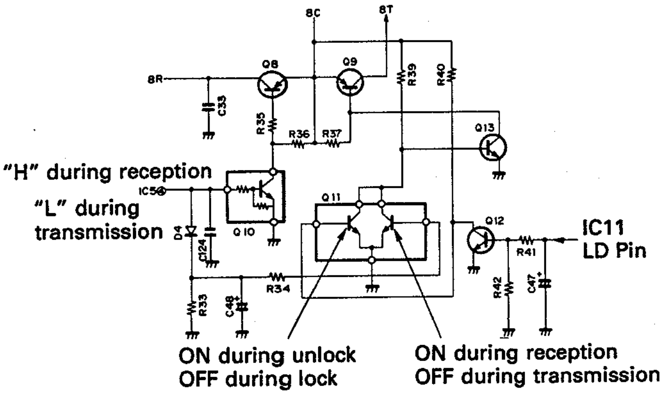

8C
8T
8R
Q8
Q9
C33
R35
R36
R37
R39
R40
Q13
"H" during reception
IC5
"L" during transmission
D4
C124
Q10
Q11
Q12
R41
IC11 LD Pin
R34
R33
C48
R42
C47
ON during unlock
OFF during lock
ON during reception
OFF during transmission

Fig. 23 Unlock Circuit

- **Predrive circuit HIC (KCB09)**

The VCO output is amplified by Q22, then input to pre-drive circuit HIC IC7. An average 22 to 23 dBm output is obtained by inputting 0 dBm through three-stage (2SC4093 and 2SC3357 x 2) amplification. An alumina board and hybrid integrated circuit are used to ensure stable circuit operation.

- **Drive circuit HIC (KCB10)**

The VCO output is amplified by KCB09, then input to drive circuit HIC. An average 29 dBm output is obtained by inputting 20 dBm through one-stage (2SC3814) amplification. An integrated radiation plate and alumina board are used to attain a stable output against heating.

- **ALT**

It is almost the same circuit construction as the TM-531A/E.

Refer to page 6 in the TM-531A/E service manual for more information.

TM-641/741

Digital Control Block

- **Outline**

The digital control block is classified into a panel block and control unit block. The panel block consists of a key, rotary encoder input circuit, and display circuit. The control unit block consists of reset and backup circuits, a tone output circuit, and a microphone tone input circuit.

- **Panel and control unit data communication circuit**

Figure 24 shows the panel and control unit data communication circuit. The S0 pin indicates serial data output and the S1 pin serial data input. An inverter is inserted for microcomputer port protection.

The data communication system is asynchronous, and the communication data rate is 19,200 bps. This data rate is about 16 times that of RC-20 and about 4 times those of other companies. The connection is checked every 0.5 second by a microcomputer on the control unit. Therefore, the power is switched off when the panel block is removed.

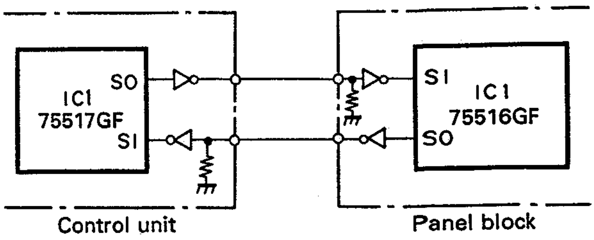

IC1
75517GF
SO
SI
Control unit
SI
IC1
75516GF
SO
Panel block

Fig. 24

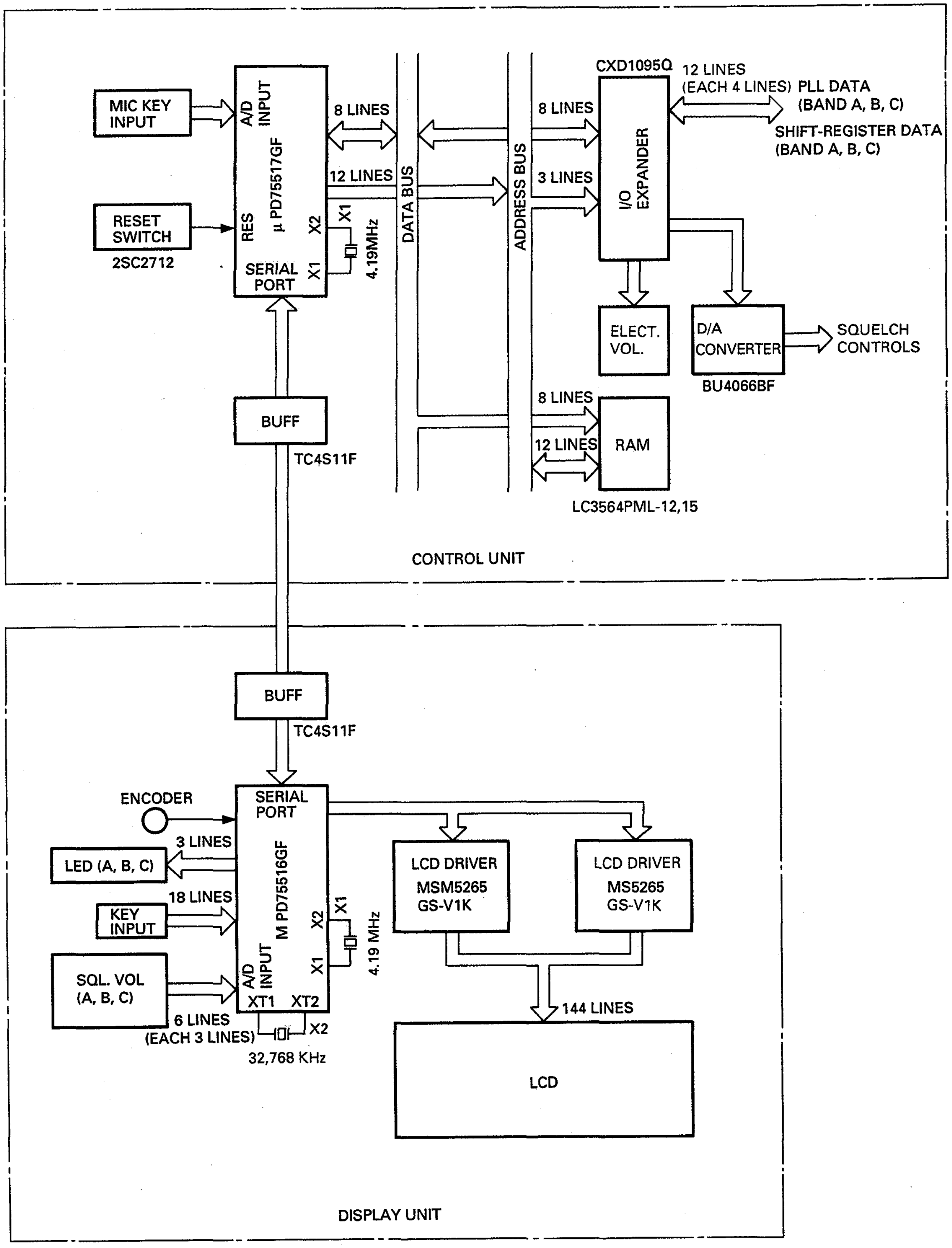

MIC KEY INPUT
A/D INPUT
RESET SWITCH
2SC2712
RES
µ PD75517GF
X2
X1
4.19MHz
SERIAL PORT
8 LINES
12 LINES
DATA BUS
ADDRESS BUS
8 LINES
3 LINES
CXD1095Q
I/O EXPANDER
12 LINES
(EACH 4 LINES)
PLL DATA
(BAND A, B, C)
SHIFT-REGISTER DATA
(BAND A, B, C)
ELECT. VOL.
D/A CONVERTER
BU4066BF
SQUELCH CONTROLS
8 LINES
12 LINES
RAM
LC3564PML-12,15
BUFF
TC4S11F
CONTROL UNIT
BUFF
TC4S11F
ENCODER
SERIAL PORT
3 LINES
LED (A, B, C)
18 LINES
KEY INPUT
SQL. VOL (A, B, C)
M PD75516GF
A/D INPUT
X2
X1
4.19 MHz
XT1
XT2
6 LINES
(EACH 3 LINES)
X2
32,768 KHz
LCD DRIVER
MSM5265
GS-V1K
LCD DRIVER
MS5265
GS-V1K
144 LINES
LCD
DISPLAY UNIT

Fig. 25 TM-641A/741A/741E Control Block Diagram

Panel unit (display unit)

● Key rotary encoder input circuit

Each panel key signal is input from its own port. Pins 70 to 73, 60 to 63, 10 and 13 of the microprocessor are pulled up by software.

● Display circuit

The display circuit is in the panel unit, and is controlled by the microprocessor of the panel unit. It consists of two LCD drivers and their peripheral circuits.

The LCD is driven dynamically with 1/2 duty. Serial data is transferred from pins 102, 103, and 110 of the CPU (IC1: UPD75516GF) to the LCD driver. There are 141 segments.

● Dimmer circuit

The dimmer circuit changes the brightness of the lamp in four steps. Figure 1 shows the dimmer circuit. Q2 amplifies the error of the stabilized power supply using a 5 V reference voltage. Pins 132 and 133 of the microprocessor are open drain, and the output voltage can be controlled in four steps by grounding this port.

Pin 130 connected to the emitter of Q3 is also open drain. If it is open, Q3 is turned off, and no lamp voltage is output. If pin 130 is grounded, Q3 turns on and the lamp lights.

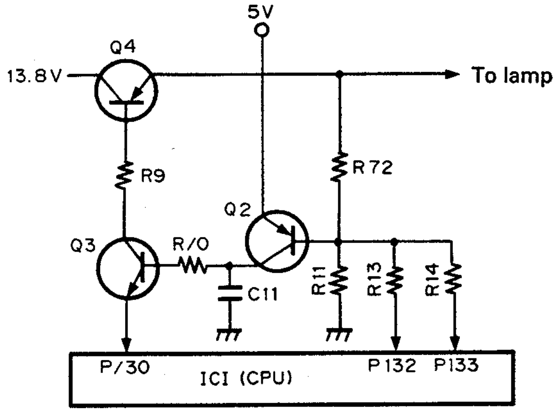


Fig. 26 Dimmer circuit

● Control band LED lighting circuit

The LED brightness is changed by switching the current to one of two ports for each LED. It is changed in two steps corresponding to lamp dimmers d1, d2, and d3, d4.

● Squelch volume input

The squelch volume for each band works by converting the voltage output by dividing 5 V applied to the variable resistor at the analog port of the microprocessor, and so reads the rotation angle. If the rotation angle changes, a command corresponding to the value is sent to the control unit.

● Reset backup circuit

When the power supply is connected, a low-level pulse of about 3 ms is output by the reset IC (IC7) and reset switch (Q1). This pulse power-on resets the CPU (IC1). When the power supply is disconnected, 13.8 V and line voltage drop are detected, the INT4 switch (Q6) turns off, and INT4 of the CPU (IC1) goes high. The microprocessor enters the backup mode, and if the backup switch (S2) is on, the clock count is performed (in 0.5-second intervals) by the BA1 power, and the 32.768 MHz crystal (X2) oscillates.

Control Unit Block

● Microphone key input circuit

Microphone UP/DOWN keys and function keys are connected to the analog input pins of a microcomputer. Each function is activated by the voltage generated when the keys are set on.

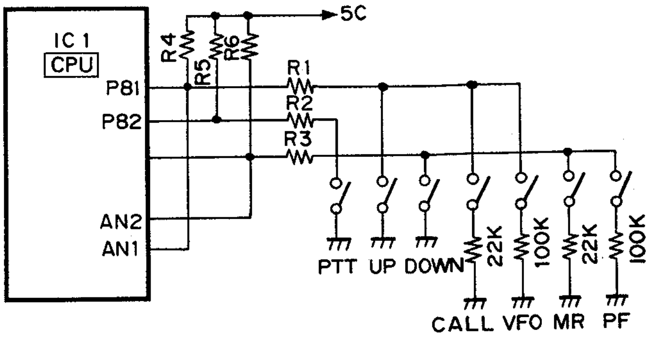


Fig. 27 Microphone key Input Circuit

- **Shift-register circuit**

  The serial data from the microcomputer is passed through IC6 and IC7 (BU4094BF) to perform the following control operation.

Shift-Register Port Specification List (Common)

Control unit (X53-3310-XX)A/2:IC6.7

Shift-register A 4094

S. Reg Port	Pin No.	Port data	SA VE	Back up	Function	Pin name
Q1	4	PD_BZA			BAND A beep 0: Sounds 1: Does not sound	BZA
Q2	5	PD_BZA			BAND B beep 0: Sounds 1: Does not sound	BZB
Q3	6	PD_BZA			BAND C beep 0: Sounds 1: Does not sound	BZD
Q4	7	PD_MUTEA			BAND A MUTE 0:OFF 1: ON	MUTEA
Q5	14	PD_MUTEB			BAND B MUTE 0:OFF 1: ON	MUTEB
Q6	13	PD_MUTEC			BAND C MUTE 0:OFF 1:ON	MUTEC
Q7						
Q8					SRAM A12 0: Nornal 1: Abnormal	BANK

Shift-register B 4094

S. Reg Port	Pin No.	Port data	SA VE	Back up	Function	Pin name
Q1	4	PD_CTC1			CTCSS operation unit selection *1	CTC1
Q2	5	PD_CTC2			CTCSS operation unit selection *1	CTC2
Q3	6	PD_RD1			Detection output connection unit selection *3	RD1
Q4	7	PD_RD2			Detection output connection unit selection *3	RD2
Q5	14	PD_DTS1			DTSS operation unit selection *2	DTS1
Q6	13	PD_DTS2			DTSSoperation unit selection *2	DTS2
Q7	12					
Q8	11	PD_DTSEL			DTSS input selection 0: Detection output 1:MIC	DTSEL

*1, *2, *3

CTC2	CTC1	CTCSS operation unit
DTS2	DTS1	DTSS operation unit
RD2	RD1	Detection output connection unit
0	0	A
0	1	B
1	X	C

I/O Port Specification List

Control unit (X53-3310-XX) : IC1

μPD75517 I/O port list

μCOM Port	Port	I/O	Pull up	Back up	Description	Pin name
INT4 P00	P_VF	I			Power check 0: Operation 1: Backup	
SCK0 P01	P_RFMID	I	○		Lower-power unit TX power selection 0: Three stages (middle stage) 1: Two stages (no middle stage)	
S10/SB1 P02	P_SO	O	○		Panel microcomputer SI	
S10/SB1 P03	P_SI	I	○		Panel microcomputer SO	
INT0 P10		I		I		
INT1 P11	P_CTCSS	I		I	CTCSS detection 0: Tone coincides	SDO
INT2 P12	P_STD	I		I	DTMF detection (LC7385 standard) 0: No signal 1: Signal detected	DV
T10 P13	P_DTSCHK	I		I	DTSS connection check 0: No connection 1: Connection	VCK
PTO0 P20	P_BEEP	O		L	Beep sound output pin (effect sound) Set low when no beep sound is output	BZ
P21	P_DTOE	O		L	DTMF receiver LC7385 TOE	EN
PCL P22	P_DTCE	O		L	DTMF tone generator TP5088 CE	CE
BUZ P23	P_CLK	O		L	CTCSS unit/shift registerr/electronic volume clock	CK
P30	P_ET	O I		I	CTCSS unit eneable connection check 0: Connection 1: No connection	ET
P31						
P32	P_FANDL0	I	Δ	I	FAN delay time setting input *1	
P33	P-FANDL1	I	Δ	I	FAN delay time setting input *1	
P40	P_DAT0	I/O	●	I	External RAM, i/o expander data, and DTMF data (D0/Q1)	
P41	P_DAT1	I/O	●	I	↑ (D1/Q2)	
P42	P_DAT2	I/O	●	I	↑ (D2/Q3)	
P43	P_DAT3	I/O	●	I	↑ (D3/Q4)	
P50	P_DAT4	I/O	●	I	External RAM and I/O expander data	

CIRCUIT DESCRIPTION

µPD75517 I/O List

µCOM Port	Port	I/O	Pull up	Back up	Description	Pin name
P51	P_DAT5	I/O	●	I	↑	
P52	P_DAT6	I	●	I	↑	
P53	P_DAT7	O	●	I	↑	
KR0 P60	P_SI	O		I	Subtone output bit 0	
KR1 P61	P_TONE	O		I	Subtone output bit 1	
KR2 P62	P_TONE	O		I	Subtone output bit 2	
KR3 P63	P_TONE	O		I	Subtone output bit 3	
KR4 P70	P_TONE	O		I	Subtone output bit 4	
KR5 P71	P_TONE	I		I	Subtone output bit 5	
KR6 P72	P_TONE	O		I	Subtone output bit 6	
KR7 P73	P_TONE	O		I	Subtone output bit 7	
PPO P80						
SCK P81	P_UP	I	●		Microphone up	
SO1 P82	P_PTT	I	●	I	Microphone PTT	
S11 P83	P_DOWN	I	●	I	Microphone down	
P90	P-A0	I		I	External RAM and I/O ex[amder address (OPEADR)	
P91	P-A1	O		I	↑ (RAMADRL)	
P92	P_A2	O		I	↑	
P93	P_A3	O		I	External RAM address	
P100	P_A4	O		I	↑ (RAMADRH)	
P101	P_A5	O		I	↑	
P102	P_A6	O			↑	
P103	P_A7	O			↑	

CIRCUIT DESCRIPTION

µPD75517 I/O Port List

µCOM Port	Port	I/O	Pull up	Back up	Description	Pin name
P110	P_A8	O		I	↑	
P111	P_A9	O		I	↑	
P112	P_A10	O		I	↑	
P113	P_A11	O		L	↑	
P120	P_RAMOE	O	●	H	External RAM OE (L) L:Read	OE
P121	P_RAMRW	O	●	H	External RAM R/W L:Write H: Normal	R/W
P122	P_RAMCE2	O	●	L	External RAM CE2 L: Backup	CE2
P123	P_10CS	O	●	L	I/O Expander CS(L)	CS
P130	P_10RD	O	●	I	I/O Expander RD(L)	RD
P131	P_10WR	O	●	I	I/O Expander WR(L)	WR
P132	P_VOLEN1	O	●	I	Electronic volume enable 1 L: Buzzer R: Band C	EV1
P133	P_VOLEN2	O	●	I	Electronic volume enable 2 L: Band B R: Band A	EV2
P140	P_ES	O		I	Shift Register Enable	ES
P141	P_PSW	O		I	MicMUTE 0: MUTE OFF 1: MUTE ON	
P142	P_PSW	O		I	POWER switch 0: Power on 1: Power off	PSW
P143	P_DAT	O		I	CTCSS unit, shift register, and electronic volume data	DT
AN0	P_DNAN	I			DOWN, MR, PF key input	
AN1	P_UPAN	I			UP, CALL, and VFO key input	
AN2	P_SMA	I			Band unit A signal-strength meter input	
AN3	P_ALTA	I			Band unit A ALT input	
AN4 P150	P_SMB	I			Band unit B signal-strength meter input	
AN5 P151	P_ALTB	I			Band unit B ALT input	
AN6 P152	P_SMC	I			Band unit C signal-strength meter input	
AN7 P153	P_ALTC	I			Band unit C ALT input	

Δ :	Pulled up by software during check (note that P_ET is set high during check).
○ :	Pulled up by software at all times.
● :	Pulled up by hardware.

*1 FAN delay time setting input

FAN control	P_FANDL1	P_FANDL0
Always on during power-on sequence	0	0
On during transmission	0	1
On during transmission and for 1 minute after transmission	1	0
On during transmission and on for 2 minutes after transmission	1	1

I/O Expander Port Specification List

Control unit (X53-3310-XX) B/2 : IC 101

CXF1095Q I/O Port List

Port	I/O	Back up	Description	Pin name
PA0	I/O		BAND Unit C PLL Enable *3	EPC
PA1			BAND Unit c PLL/Shift Register Clock *3	CKC
PA2			BAND Unit C PLL/Shift Register Data *3	DTC
PA3			BAND Unit C Shift Register Enable	ESC
PA4	I		BAND Unit A busy input 0: Busy 1: Close	SCA
PA5			BAND Unit B busy input 0: Busy 1: Close	SCB
PA6			BAND Unit C busy input 0:Busy 1: Close	SCC
PA7				
PB0	O		BAND Unit C SQ Out bit0	SQC0
PB1			BAND Unit C SQ Out bit1	SQC1
PB2			BAND Unit C SQ Out bit2	SQC2
PB3			BAND Unit C SQ Out bit3	SQC3
PB4			BAND Unit B SQ Out bit0	SQB0
PB5			BAND Unit B SQ Out bit1	SQB1
PB6			BAND Unit B SQ Out bit2	SQB2
PB7			BAND Unit B SQ Out bit 3	SQB3
PC0	O		BAND Unit A SQ Out bit0	SQA0
PC1			BAND Unit A SQ Out bit1	SQA1
PC2			BAND Unit A SQ Out bit2	SQA2
PC3			BAND Unit A SQ Out bit3	SQA3
PC4	O		BAND Unit A SQ Out bit4	SQA4
PC5			BAND Unit A SQ Out bit5	SQA5
PC6			BAND Unit B SQ Out bit4	SQB4
PC7			BAND Unit B SQ Out bit5	SQB5
PD0	I/O		BAND Unit A PLL Enable *1	EPA
PD1			BAND Unit A PLL/Shift Register Clock *1	CKA
PD2			BAND Unit A PLL/Shift Register Data *1	DTA
PD3			BAND Unit A Shift Register Enable	ESA
PD4			BAND Unit B PLL Enable *2	EPB
PD5			BAND Unit B PLL/Shift Register Clock *2	CKB
PD6			BAND Unit B PLL/Shift Register Data *2	DTB
PD7			BAND Unit B Shift Register Enable	ESB
PE0	I/O		FAN ON/OFF 0: OFF 1: ON	FANSW
PE1			PSW other than 5C	OSW2
PE2			BAND Unit C SQ Out bit4	SQC4
PE3			BAND Unit C SQ Out bit5	SQC5

CIRCUIT DESCRIPTION

*1, *2, *3 Type of band unit

BAND Unit	DTx	CKx	EPx	Unit No.	No. of data items after conversion
No unit	0	0	0	0	0
28 MHz BAND	1	0	0	4	1
50 MHz BAND	1	1	0	6	2
144 MHz BAND	0	1	1	3	3
220MHz BAND	0	1	0	2	4
430MHz BAND	1	0	1	5	5
1200MHz BAND	0	0	1	1	6

Note:

An x indicates A, B, or C. The number of data items after conversion indicates the data used in a program.

CIRCUIT DESCRIPTION

I/O Expander Port Specification List

DISPLAY UNIT (X54-3120-00) : IC1

μPD75516 (IC1) I/O Port List

μCOM Port	Port name	I/O	Pull up	Back up	Description	Circuit Pin name
INT4 P00	P_INT4	I		I	Power check 0: Operation 1: Backup	
SCK0 P01	P_01	I	○	I		
SO0/SB0 P02	P_SO	O	○	I	Serial data out	
SI0/SB1 P03	P_S1	I	○	I	Serial data in	
INT0 P10	P_ENCDCK	I		I	Encoder (CLK)	
INT1 P11	P_INT1	I		I	Connect to serial data in.	
INT2 P12	P_PSKEY	I		I	Power switch 0: NORMAL 1: PUSH	
T10 P13	P_ENCDDT	I		I	Encoder (DAT)	
PTO0 P20	P_TYPE0	I	○	I	Destination data B0	
P21	P_TYPE1	I	○	I	Destination data B1	
PCL P22	P_TYPE2	I	○	I	Destination data B2	
BUZ P23	P_TYPE3	I	○	I	Destination data B3	
P30	P_LEDOC1	O		I	Operation band LED Orange C 0: ON (Bright) 1: OFF/ON (dark)	
P31	P_LEDGC2	O		I	Operation band LED Orange C 0: ON (Bright)/ON (dark) 1: OFF	
P32	P_LEDGC1	O		I	Operation band LED Green C 0: ON (Bright) 1: OFF/ON (dark)	
P33	P_LEDGC2	O		I	Operation band LED Green C 0: ON (Bright)/ON (dark) 1: OFF	

CIRCUIT DESCRIPTION

μPD75516 (IC1) I/O Port List

μCOM Port	Port name	I/O	Pull up	Back up	Description	Circuit Pin name
P40	P_LEDOB1	O		I	*Operation band LED Orange B* 0: ON (Bright) 1: OFF/ON (dark)	
P41	P_LEDOB2	O		I	Operation band LED Orange B 0: ON (Bright)/ON (dark) 1: OFF	
P42	P_LEDGB1	O		I	Operation band LED Green B 0: ON (Bright) 1: OFF/ON (dark)	
P43	P_LEDGB2	O		I	Operation band LED Green B 0: ON (Bright)/ON (dark) 1: OFF	
P50	P_LEDOA1	O		I	Operation band LED Orange A 0: ON (Bright) 1: OFF/ON (dark)	
P51	P_LEDOA2	O		I	Operation band LED Orange A 0: ON (Bright)/ON (dark) 1: OFF	
P52	P_LEDGA1	O		I	Operation band LED Green A 0: ON (Bright) 1: OFF/ON (dark)	
P53	P_LEDGA2	O		I	Operation band LED Green A 0: ON (Bright)/ON (dark) 1: OFF	
KR0 P60	P_VFO	O	○	I	VFO key 0: PUSH 1: NORMAL	
KR1 P61	P_MR	O	○	I	MR key 0: PUSH 1: NORMAL	
KR2 P62	P_MHZ	O	○	I	MHz key 0: PUSH 1: NORMAL	
KR3 P63	P_CALL	O	○	I	CALL key 0: PUSH 1: NORMAL	
KR4 P70	P_BELL	O	○	I	BELL (SHIFT) key 0: PUSH 1: NORMAL	
KR5 P71	P_TONE	O	○	I	TONE key 0: PUSH 1: NORMAL	
KR6 P72	P_REV	O	○	I	REV key 0: PUSH 1: NORMAL	

CIRCUIT DESCRIPTION

µPD75516 (IC1) I/O Port List

µCOM Port	Port name	I/O	Pull up	Back up	Description	Circuit Pin name
KR7 P73	P_DTSS	O	○	I	DTSS key 0: PUSH 1: NORMAL	
PPO P80	P_LOW	I	●	I	LOW key 0: PUSH 1: NORMAL	
SCK1 P81	P_MUTE	I	●	I	MUTE key 0: PUSH 1: NORMAL	
SO1 P82	P_CSA	I	●	I	CONT SEL A key 0: PUSH 1: NORMAL	
SI1 P83	P_CSB	I	●	I	CONT SEL B key 0: PUSH 1: NORMAL	
P90	P_IF430	I	●	I	IF selection (430MHz) 0: 1: NORMAL	
P91	P_IF50	I	●	I	IF selection (50MHz) 0: NORMAL 1:	
P92	P_IF28	I	●	I	IF selection (28MHz) 0: NORMAL 1:	
P93	P_CKBL	I	●	I	Time display dot flash selection 0: Flash 1: Do not flash	
P100	P_BLANK	O		I	LCD driver (MSM5265) BLANK	
P101	P_TEST	O		I	LCD driver (MSM5265) TEST	
P102	P_LCDDT	O		I	LCD driver (MSM5265) DT	
P103	P_LCDDL	O		I	LCD driver (MSM5265) CK	
P110	P_LCDLD	O		I	LCD driver (MSM5265) LD	
P111	P_111	O		I		
P112	P_112	O		I		
P113	P_FDISP	O		I	"F" display LED 0: ON 1: OFF	
P120	P_FKEY	O	●	I	F key 0: PUSH 1: NORMAL	
P121	P_DATE	O	●	I	Month/day display format selection 0: Month, day 1: Day, month	

μPD75516 (IC1) I/O·Port List

μCOM Port	Port name	I/O	Pull up	Back up	Description	Circuit Pin name
P122	P_VOLT	O	●	I	Voltage display 0: Display voltage 1: Do not display voltage	
P123	P_ILUMI	O	●	I	Dimmer 0: Reduce brightness by one step 1: Normal brightness	
P130	P_LPSW	O		I	Illumination switch 0: ON 1: OFF	
P131	P_PSW	O		I	Power switch 0: ON 1: OFF	
P132	P_DIM1	O		I	Illumination bulb (2.7k) 0: ON (D1), ON (D2) 1: ON (D3), OFF	
P133	P_DIM2	O		I	Illumination bulb (12k) 0: ON (D1), ON (D3) 1: ON (D2), OFF	
P140	P_CSC	I	●	I	CONTSEL C 0: PUSH 1: NORMAL	
P141	P_BSA	I	●	I	BAND SEL A 0: PUSH 1: NORMAL	
P142	P_BSB	I	●	I	BAND SEL B 0: PUSH 1: NORMAL	
P143	P-BSC	I	●	I	BAND SEL C 0: PUSH 1: NORMAL	
AN0		AD			Band A squelch input	
AN1		AD			Band B squelch input	
AN2		AD			Band C squelch input	
AN3		AD			Band A volume input	
AN4 P150		AD			Band B volume input	
AN5 P151		AD			Band C volume input	
AN6 P152		AD			SB/4 input (for voltage display)	
AN7 P153		AD				

○ : Always pulled up by software.
● : Always pulled up by hardware.

CIRCUIT DESCRIPTION

LCD Driver (MSM 5265) list

DISPLAY UNIT (X54-3120-00): IC2, IC3

MSM 5265 (IC2) list

IC Pin No.	IC Pin Name	LCD SEG.		LCD Term. No.
		COM0	COM1	
51	S1			144
52	S2			143
53	S3			142
54	S4	ACC	MUTE	141
55	S5	A.B.C.	TOT	140
56	S6	APO	A.	139
57	S7	LOCK	SLEEP	138
58	S8	OFF	ON	137
59	S9		TIMER	136
60	S10	ⒸM	ⒸONAIR	135
61	S11	ⒸL	ⒸS7	134
62	S12	ⒸS6	ⒸS5	133
63	S13	ⒸBELL	ⒸCO	132
64	S14	Ⓒ05K	Ⓒ1Kc	131
65	S15	Ⓒ1Kg	Ⓒ1Kb	130
66	S16	Ⓒ1Ka	Ⓒ1Kf	129
67	S17	Ⓒ1Kd	Ⓒ1Ke	128
68	S18	ⒸS3	ⒸS4	127
69	S19	ⒸDTSS	ⒸS2	126
70	S20	ⒸC CSS	ⒸT	125
71	S21	Ⓒ10kdp	Ⓒ10Kc	124
72	S22	Ⓒ10Kg	Ⓒ10Kb	123
73	S23	Ⓒ10Ka	Ⓒ10Kf	122
74	S24	Ⓒ10Kd	Ⓒ10Ke	121
75	S25	ⒸCLKdp1	ⒸCLKdp2	120
76	S26	Ⓒ100Kdp	Ⓒ100Kc	119
77	S27	Ⓒ100Kg	Ⓒ100Kb	118
78	S28	Ⓒ100Ka	Ⓒ100Kf	117
79	S29	Ⓒ100Kd	Ⓒ100Ke	116
80	S30	ⒸS1	ⒸBUSY	115
81	S31	ⒸREV	Ⓒ+	114
82	S32	ⒸL−	ⒸR−	113
83	S33	Ⓒ1Mdp	Ⓒ1Mc	112
84	S34	Ⓒ1Mg	Ⓒ1Mb	111
85	S35	Ⓒ1Ma	Ⓒ1Mf	110
86	S36	Ⓒ1Md	Ⓒ1Me	109
87	S37	ⒸF	Ⓒ10Mc	108
88	S38	Ⓒ10Mg	Ⓒ10Mb	107
89	S39	Ⓒ10Ma	Ⓒ10Mf	106
90	S40	Ⓒ10Md	Ⓒ10Me	105
91	S41	Ⓒ>	ⒸALT	104
92	S42	Ⓒ<	ⒸPTT	103
93	S43	Ⓒ1Gbc	Ⓒ100Mc	102
94	S44	Ⓒ100Mg	Ⓒ100Mb	101
95	S45	Ⓒ100Ma	Ⓒ100Mf	100
96	S46	Ⓒ100Md	Ⓒ100Me	99
97	S47	Ⓒ☆	ⒸMRHc	98
98	S48	ⒸMRHg	ⒸMRHb	97
99	S49	ⒸMRHa	ⒸMRHf	96
100	S50	ⒸMRHd	ⒸMRHe	95
1	S51	ⒸS&RF	ⒸMRLc	94
2	S52	ⒸLRLg	ⒸMRLb	93
3	S53	ⒸMRLa	ⒸMRLf	92
4	S54	ⒸMRLd	ⒸMRLe	91
5	S55	ⒷM	ⒷONAIR	90
6	S56	ⒷL	ⒷS7	89
7	S57	ⒷS6	ⒷS5	88
8	S58	ⒷBELL	ⒷCO	87
9	S59	Ⓑ05K	Ⓑ1Kc	86
10	S60	Ⓑ1Kg	Ⓑ1Kb	85
11	S61	Ⓑ1Ka	Ⓑ1Kf	84
12	S62	Ⓑ1Kd	Ⓑ1Ke	83
13	S63	ⒷS3	ⒷS4	82
14	S64	ⒷDTSS	ⒷS2	81
15	S65	ⒷC CSS	ⒷT	80
16	S66	Ⓑ10Kdp	Ⓑ10Kc	79
17	S67	Ⓑ10Kg	Ⓑ10Kb	78
18	S68	Ⓑ10Ka	Ⓑ10Kf	77
19	S69	Ⓑ10Kd	Ⓑ10Ke	76
20	S70	ⒷCLKdp1	ⒷCLKdp2	75
21	S71	Ⓑ100Kdp	Ⓑ100Kc	74
22	S72	Ⓑ100Kg	Ⓑ100Kb	73
23	S73	Ⓑ100Ka	Ⓑ100Kf	72
24	S74	Ⓑ100Kd	Ⓑ100K	71
25	S75	ⒷS1	ⒷBUSY	70
26	S76	ⒷREV	Ⓑ+	69
27	S77	ⒷL−	ⒷR−	68
28	S78	Ⓑ1Mdp	Ⓑ1Mc	67
29	S79	Ⓑ1Mg	Ⓑ1Mb	66
30	S80	Ⓑ1Ma	Ⓑ1Mf	65
48	COM-A			
49	COM-B			

CIRCUIT DESCRIPTION

MSM 5265 (IC3) list

IC Pin No.	IC Pin Name	LCD SEG. COM0	LCD SEG. COM1	LCD Term. No.
51	S1	Ⓑ1Md	Ⓑ1Me	64
52	S2	ⒷF	Ⓑ10Mc	63
53	S3	Ⓑ10Mg	Ⓑ10Mb	62
54	S4	Ⓑ10Ma	Ⓑ10Mf	61
55	S5	Ⓑ10Md	Ⓑ10Me	60
56	S6	Ⓑ>	ⒷALT	59
57	S7	Ⓑ<	ⒷPTT	58
58	S8	Ⓑ1Gbc	Ⓑ100Mc	47
59	S9	Ⓑ100Mg	Ⓑ100Mb	56
60	S10	Ⓑ100Ma	Ⓑ100Mf	55
61	S11	Ⓑ100Md	Ⓑ100Me	54
62	S12	Ⓑ☆	ⒷMRHc	53
63	S13	ⒷMRHg	ⒷMRHb	52
64	S14	ⒷMRHa	ⒷMRHf	51
65	S15	ⒷMRHd	ⒷMRHe	50
66	S16	ⒷS&RF	ⒷMRLc	49
67	S17	ⒷMRLg	ⒷMRLb	48
68	S18	ⒷMRLa	ⒷMRLf	47
69	S19	ⒷMRL d	ⒷMRLe	46
70	S20	ⒶM	ⒶONAIR	45
71	S21	ⒶL	ⒶS7	44
72	S22	ⒶS6	ⒶS5	43
73	S23	ⒶBELL	ⒶCO	42
74	S24	Ⓐ05K	Ⓐ1Kc	41
75	S25	Ⓐ1Kg	Ⓐ1Kb	40
76	S26	Ⓐ1Ka	Ⓐ1Kf	39
77	S27	Ⓐ1Kd	Ⓐ1Ke	38
78	S28	ⒶS3	ⒶS4	37
79	S29	ⒶDTSS	ⒶS2	36
80	S30	ⒶC CSS	ⒶT	35
81	S31	Ⓐ10Kdp	Ⓐ10Kc	34
82	S32	Ⓐ10Kg	Ⓐ10Kb	33
83	S33	Ⓐ10Ka	Ⓐ10Kf	32
84	S34	Ⓐ10Kd	Ⓐ10Ke	31
85	S35	ⒶCLKdp1	ⒶCLKdp2	30
86	S36	Ⓐ100Kdp	Ⓐ100Kc	29
87	S37	Ⓐ100Kg	Ⓐ100Kb	28
88	S38	Ⓐ100Ka	Ⓐ100Kf	27
89	S39	Ⓐ100Kd	Ⓐ100Ke	26
90	S40	ⒶS1	ⒶBUSY	25
91	S41	ⒶREV	Ⓐ+	24
92	S42	ⒶL–	ⒶR–	23
93	S43	Ⓐ1Mdp	Ⓐ1Mc	22
94	S44	Ⓐ1Mg	Ⓐ1Mb	21
95	S45	Ⓐ1Ma	Ⓐ1Mf	20
96	S46	Ⓐ1Md	Ⓐ1Me	19
97	S47	ⒶF	Ⓐ10Mc	18
98	S48	Ⓐ10Mg	Ⓐ10Mb	17
99	S49	Ⓐ10Ma	Ⓐ10Mf	16
100	S50	Ⓐ10Md	Ⓐ10Me	15
1	S51	Ⓐ>	ⒶALT	14
2	S52	Ⓐ<	ⒶPTT	13
3	S53	Ⓐ1Gbc	Ⓐ100Mc	12
4	S54	Ⓐ100Mg	Ⓐ100Mb	11
5	S55	Ⓐ100Ma	Ⓐ100Mf	10
6	S56	Ⓐ100Md	Ⓐ100Me	9
7	S57	Ⓐ☆	ⒶMRHc	8
8	S58	ⒶMRHg	ⒶMRHb	7
9	S59	ⒶMRHa	ⒶMRHf	6
10	S60	ⒶMRHd	ⒶMRHe	5
11	S61	ⒶS&RF	ⒶMRLc	4
12	S62	ⒶMRLg	ⒶMRLb	3
13	S63	ⒶMRLa	ⒶMRLf	2
14	S64	ⒶMRLd	ⒶMRLe	1
15	S65			
16	S66			
17	S67			
18	S68			
19	S69			
20	S70			
21	S71			
22	S72			
23	S73			
24	S74			
25	S75			
26	S76			
27	S77			
28	S78			
29	S79			
30	S80			
48	COM-A			
49	COM-B			

CIRCUIT DESCRIPTION

- **Tone output circuit**

The tone output signal is input from the P60 through P63 and P70 through P73 ports of the microcomputer to ladder resistor R8 and converted from digital to analog. The 38 waves in 67.0 to 250.3 MHz are then produced. Figure 28 shows the internal configuration of R8.

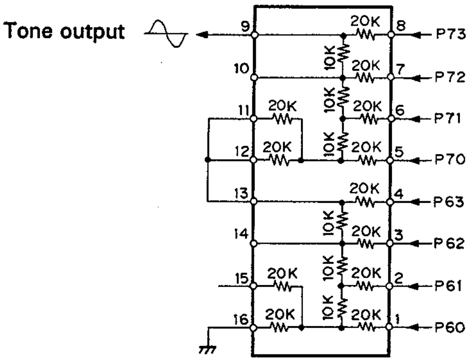


Fig. 28 Internal Configuration of Ladder Resistor (KRR-C001)

- **CTCSS unit input and output (TSU-7 (option))**

The data input to the CTCSS unit is output from P30, P23, and P143. P30 is also used for connection check. Data is input to P30 when the power is switched on. The data is output from P30 after a connection check is completed. The CTCSS unit is not set on when no connection is performed.

Figure 30 shows the data transfer format, and figure 31 shows the data configuration. A low signal is input to the P11 pin of the microcomputer when the tone detected from the CTCSS unit coincides. The squelch is then opened.

One CTCSS unit can correspond to three bands by switching detection signal RD output from a band unit.

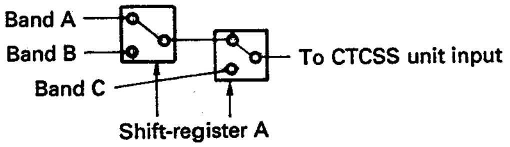


Fig. 29

As the figure above shows, the analog switch is selected with two-bit data.

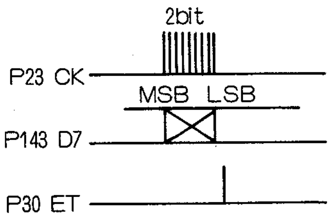


Fig . 30 CTCSS Data Transfer Format

Tone frequency selection data of CTCSS FX365

	D0	D1	D2	D3	D4	D5
Example 88.5 Hz (DTMF unit)	L	H	H	H	L	L

Fig. 31 CTCSS Data Configuration

- **DTMF unit input and output (DTU-2 (option))**

Data input to the DTMF unit is output from P21, P22, and P40 through P43 of the microcomputer. An encoder is activated when P40 through P43 output data and when P2 is high.

Similar to the CTCSS unit, when a decoder selects a detection signal and detects the input signal, a high signal is input to P12, P21 is set high, and data is input to P40 through P43. The microcomputer then judges whether the data coincides with a DTSS code.

- **PLL data output**

The PLL data is passed through I/O expander IC101 (CXD1095Q) from the microcomputer and output to each band unit with EP, CK, and DT signals and three serial data items.

A PLL IC (M56760FP) is used in common with the 144 and 430 TX/RX units. Figure 32 shows the data configuration. Figure 33 and 34 shows the PLL data transfer format.

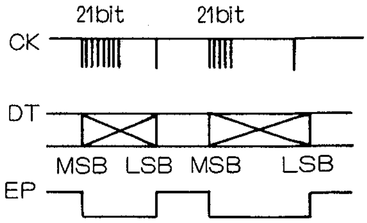
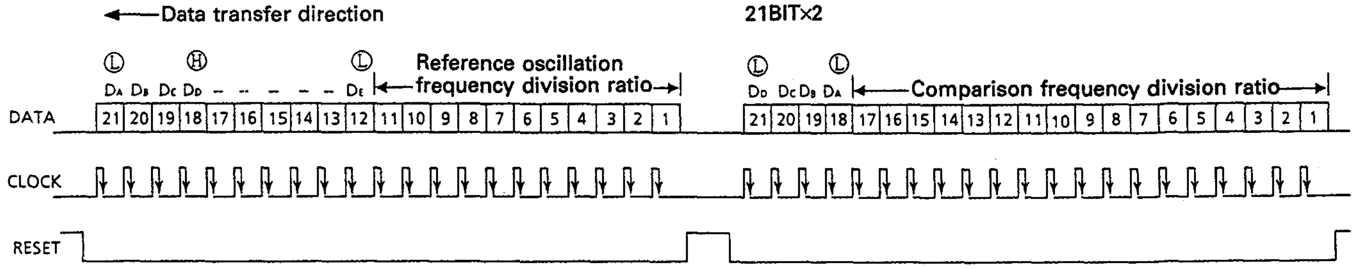


Fig. 32 PLL Data Configuration


Data transfer direction
21BIT×2
Ⓛ Ⓗ Ⓛ
D_A D_B D_C D_D D_E
Reference oscillation frequency division ratio
Ⓛ Ⓛ
D_D D_C D_B D_A
Comparison frequency division ratio
DATA
21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
CLOCK
RESET

f_{REF} = 12800 ÷ (8 x Reference oscillation frequency division ratio)

Reference oscillation frequency division ratio = 16000 / f_{REF} (kHz)

5 kHz .... P = 320
6.25 kHz ..... P = 256

Reference oscillation frequency division ratio

1	2	3	4	5	6	7	8	9	10	11	
0	0	0	0	0	0	1	0	1	0	0	(320)
0	0	0	0	0	0	0	0	1	0	0	(256)

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	01 40 5 kHz
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	01 00 5.25 kHz

Special bit function

Bit	Name	H	L
D_A	Data latch selection	Reference	Comparison
D_B	SW2	H: OFF	L: ON
D_C	SW1	H: OFF	L: ON
D_D	POWER switch	OFF	ON
D_E	Test	Test	Normal

PLL data-to-bit relationship

ADD	BIT			
	0	1	2	3
1BH	1	2	3	4
1CH	5	6	7	8
1DH	9	10	11	12
1BH	13	14	15	16
1FH	17	–	–	–

Fig. 33 M56760 PLL DATA

1F	1E	1D	1C	1B	1A
–	6	10	14	18	1
–	7	11	15	19	2
–	8	12	16	20	3
5	9	13	17	21	4

1F	1E	1D	1C	1B	1A
–	2^{15}	2^{11}	2^7	2^3	D_D
–	2^{14}	2^{10}	2^6	2^2	D_C
–	2^{13}	2^9	2^5	2^1	D_B
2^{16}	2^{12}	2^8	2^4	2^0	D_A

For frequency division ratio setting

1F	1E	1D	1C	1B	1A
–	×	D_E	2^7	2^3	D_D
–	×	2^{10}	2^6	2^2	D_C
–	×	2^9	2^5	2^1	D_B
×	×	2^8	2^4	2^0	D_A

For comparison frequency

Data	State
D_E	
L	Normal
H	Test

Data	PLL
D_E	POWER switch
L	ON
H	OFF

Data		Output port	
D_H	D_C	SW2	SW1
L	L	ON	ON
H	L	OFF	ON
L	H	ON	OFF
H	H	OFF	OFF

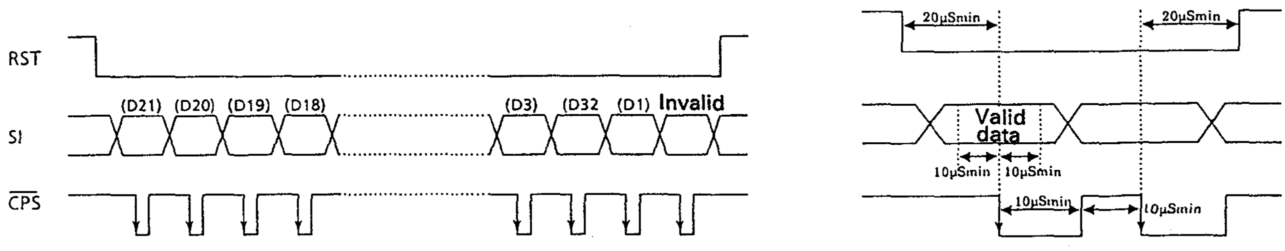

RST
SI
(D21) (D20) (D19) (D18)
(D3) (D32 (D1) Invalid
$\overline{CPS}$
20μSmin
20μSmin
Valid data
10μSmin
10μSmin
10μSmin
10μSmin

Fig. 34 M56760 PLL DATA OUTPUT

The PLL and reference frequency-division ratio data input to the 1200 TX/RX unit are output from P21 (CK), P22 (DT), and P23 (EP1) of the CPU. The reference frequency-division ratio data (R) is output only when the power is switched on and when 10 and 12.5 kHz reference frequencies are changed.

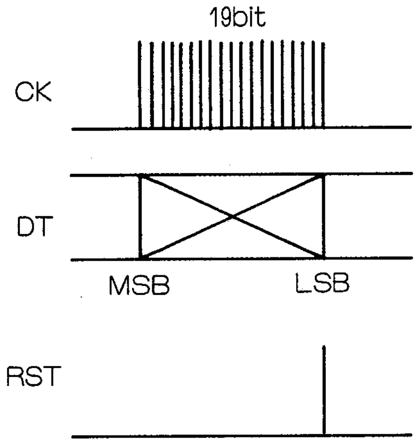

19bit
CK
DT
MSB
LSB
RST

Fig. 35 PLL Frequency-Division Ratio Data Transfer Format

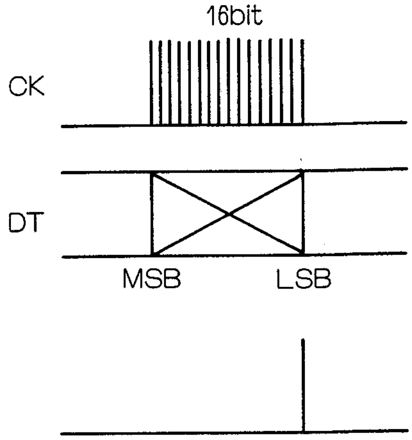

16bit
CK
DT
MSB
LSB

Fig. 36 Reference Frequency-Division Ratio Data Transfer Format

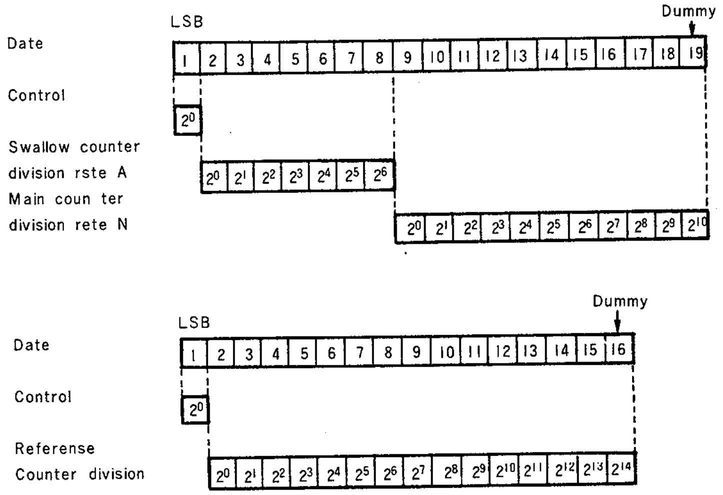

LSB
Dummy
Date
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Control
2^0
Swallow counter division rste A
2^0 2^1 2^2 2^3 2^4 2^5 2^6
Main coun ter division rete N
2^0 2^1 2^2 2^3 2^4 2^5 2^6 2^7 2^8 2^9 2^10
LSB
Dummy
Date
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Control
2^0
Referense Counter division
2^0 2^1 2^2 2^3 2^4 2^5 2^6 2^7 2^8 2^9 2^10 2^11 2^12 2^13 2^14

Fig. 37 Data Configuration

CIRCUIT DESCRIPTION

AF Signal Channel

- **Outline**

Detection signal RA from each band unit is passed through an electronic volume control and output to the power amplifier and speaker through a mute circuit, buzzer circuit, and speaker selection circuit.

Each band has an independent AF signal that can be output from the speaker in accordance with the speaker jack insertion position.

- **Volume control circuit**

The angle data of each band volume control on the panel is analog-to-digital converted by a microcomputer on the panel and converted to 5-bit data. The data from the panel block is sent to the microcomputer of the control unit, then converted. Serial data is then output from P132, P133, P23, and P143. Each band has an independent volume control. See the device function for the channel-to-band unit relationship.

- **Buzzer circuit**

A pulse is output from P20 of IC1 to sound a buzzer when keys are pressed. The pulse is mixed with the DTMF unit output signal as a monitor pulse during DTSS operation.

After that, the pulse is passed through the electronic volume control and mixed with the AF signal in a mute circuit corresponding to each band before it is mixed with the AF signal line in each band.

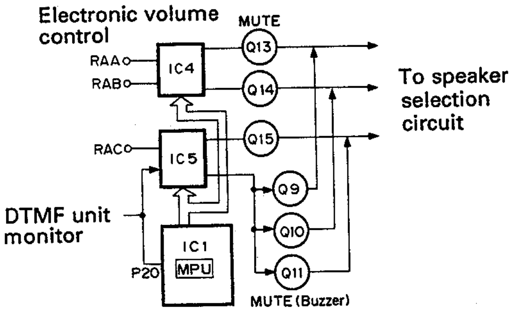

Electronic volume control
MUTE
RAA
RAB
IC4
Q13
Q14
To speaker selection circuit
RAC
IC5
Q15
Q9
DTMF unit monitor
Q10
IC1
MPU
P20
Q11
MUTE (Buzzer)

Fig. 38 Volume and Buzzer Circuits

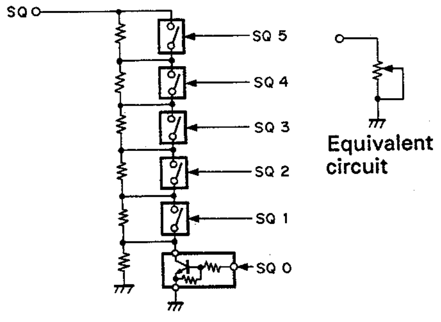

SQ
SQ 5
SQ 4
SQ 3
SQ 2
SQ 1
SQ 0
Equivalent circuit

Fig. 40 Squelch D/A Converter Circuit

- **Speaker selection circuit**

Each band unit has three speaker jacks (on rear panel), and the control unit has one speaker jack (on side panel). When a speaker is connected to a speaker jack on the band unit, the corresponding band AF signal is output.

The speaker jack on the control unit outputs a remaining mixed AF signal. The mixed signal is output from an internal speaker when a speaker is not connected to this speaker jack. Figure 39 shows the speaker selection circuit.

A signal is input to adder IC103 when no speaker is connected. The signal level does not fluctuate even if one to three signals are input to the adder.

For example, band B can mix bands A and C with one speaker and output the mixed signal from another speaker by connecting the band B jack and control unit jack.

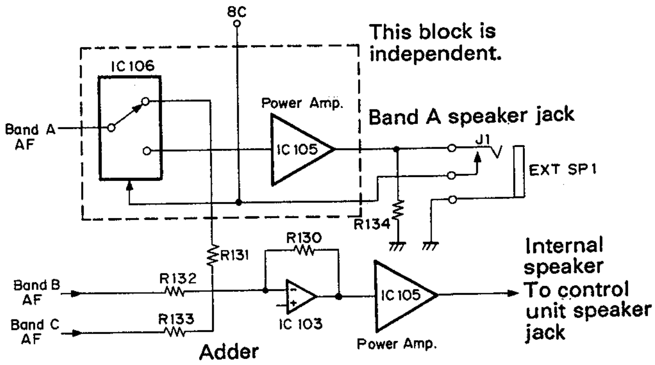

8C
This block is independent.
IC106
Power Amp.
Band A speaker jack
Band A AF
IC105
J1
EXT SP1
R134
R130
R131
Internal speaker
To control unit speaker jack
Band B AF
R132
IC105
Band C AF
R133
IC 103
Adder
Power Amp.

Fig. 39 Speaker Selection Circuit

- **Squelch circuit**

The angle data of each band squelch volume control on the panel is analog-to-digital converted and converted to 6-bit data.

The data from the panel block is sent to the microcomputer of the control unit and passed through I/O expander IC101 from the microcomputer. The data is then digital-to-analog converted by the analog switch shown in Figure 40. Each band in the circuit shown in Figure 40 is independent.

Connector Connecting the Band Unit and Control Unit

- **Outline**

The pin assignments of the connector that connects the control unit and band unit are common in three bands. The band unit is also used to check which band unit is connected.

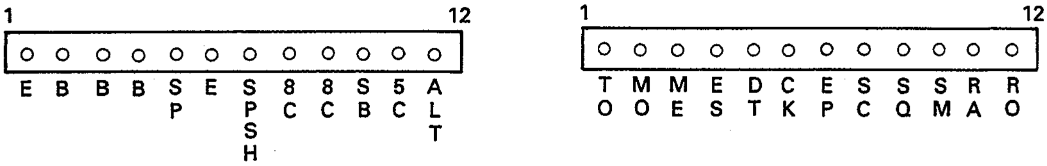


Fig. 41 Connector Connecting the Band Unit and Control Unit

Pin No.	Name	Function	Pin No.	Name	Function
1	E	GND	1	TO	67.0 to 250.3 Hz subtone output
2	B	13.8 V input	2	MO	Audio signal from microphone (including DTMF)
3	B		3	ME	Microphone ground
4	B		4	ES	Shift-register enable output
5	SP	AF signal is output when speaker jack is connected.	5	CK	Shift-register PLL clock
6	E	GND	6	DT	Shift-register PLL data
7	SPSW	Speaker jack connection and detection. "H" during connection.	7	EP	PLL enable
8	8C	8 V is output during the power-on sequence.	8	SC	"L" when squelch input is busy.
9	8C		9	SQ	50 k ohms when squelch D/A output is tight.
10	SB	13.8 V is output during the power-on sequence.	10	SM	Signal-strength meter voltage input
11	SC	5 V is output during the power-on sequence.	11	RA	Detection input (squelch circuit)
12	ACT	ALT voltage input	12	RD	Detection input (no squelch circuit)

Table 20 Pin functions (as viewed from the control unit)

- **Band retrieval**

Each band is retrieved through the EP, CK, and DT pins. Data is input for retrieval when the power is switched on and when the memory is cleared. Data is then output again.

The control unit is pulled down as shown in Figure 42. Therefore, the DT, CK, and EP pins are set low when no band unit is connected. Pins set high as listed in Table 21 are pulled up when any band unit is connected. The type of connected band unit is then judged.

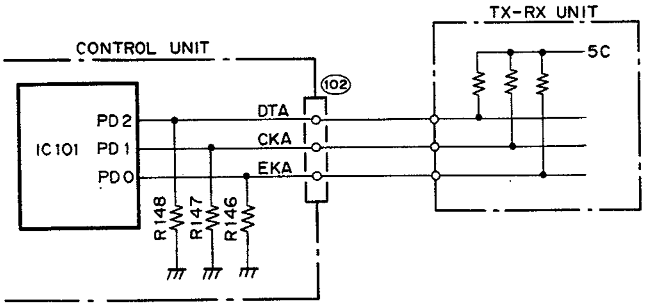


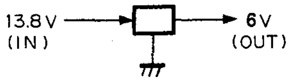
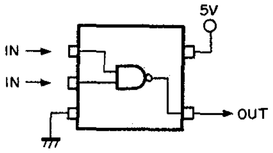
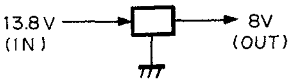
Fig. 42 Retrieval System

BAND Unit	DT	CK	EP
No Unit	L	L	L
28	H	L	L
50	H	H	L
144	L	H	H
430	H	L	H
1200	L	L	H

Table 21 Band Retrieval

DESCRIPTION OF COMPONENTS

Control Unit (X53-331X-XX) 0-12 : TM-641A(K), 741A(K, P, M, M2), 741E(E)

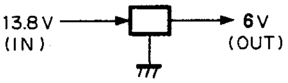
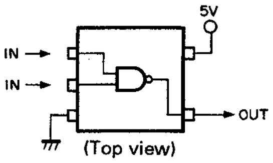
Reference No.	Function	Description
IC1	Microcomputer	See the circuit description.
IC2	SRAM memory backup	
IC3	6V AVR	Three-terminal regulator 
IC4, IC5	Electronic volume control	IC4 R-CH band A volume control IC4 L-CH band B volume control IC5 R-CH band C volume control IC5 L-CH BZ common volume control (Used in common) ③ L-CH input ⑥ L-CH output ⑪ R-CH output ⑭ R-CH input
IC6, IC7	Shift register	See the circuit description.
IC8, IC9	Analog switch	CTCSS, DTSS, or microphone RD band selection (See the circuit description.)
IC10	Low-frequency amplification and adder	Microphone amplifier and DTMF modulation adder
IC11, IC12	Serial data inverter buffer	
IC101	I/O expander	See the circuit description.
IC102	8V AVR	Three-terminal regulator 
IC103	Adder	Used for internal speaker and level compensation.
IC104, IC105	Low-frequency amplification	① Input (IC104: Band B, IC105: Common) ⑥ Output (IC104: Band B, IC105: Common) ⑦ 13.8 V ④ ⑩ ⑫ Ground ⑧ Output (IC104: Band C, IC105: Band A) ⑬ Input (IC104: Band C, IC105: Band A)
IC106	Speaker selection analog switch	④ Band C AF input ⑭ Band A AF input ⑮ Band B AF input ② Band B internal SP output ⑤ Band C internal SP output ⑫ Band A internal SP output ① Band B external SP output ③ Band C external SP output ⑬ Band A external SP output ⑪ Band A selection input ⑩ Band B selection input ⑨ Band C selection input ⑨ to ⑪ Internal SP when "L"
IC107~IC110	Analog switch	Used for squelch. (See the circuit description.)

DESCRIPTION OF COMPONENTS

Reference No.	Function	Description
Q1	Low-frequency amplification	Microphone amplifier
Q2	Buffer amplification	Used for microphone RD.
Q3	Microphone line muting	Microphone muting when power is ON (DTMF signal transmission).
Q4	RESET switch	RESET switch for IC1
Q5	BACKUP switch	ON when power is supplied
Q6, Q7, Q8	Low-frequency amplification	Q6 Band A Q7 Band B Q8 Band C
Q9, Q10, Q11	Beep sound muting	Q9 Band A Q10 Band B Q11 Band C A beep sounds from the corresponding band when OFF.
Q13, Q14, Q15	AF muting	Q13 Band A Q14 Band B Q15 Band C Muted when power is on (squelch ON, CTCSS, DTSS, etc.)
Q16	5 V POWER switch	5 V is output when power is ON.
Q17	Low-frequency amplification	Used for DTMF signal monitor.
Q101, Q102	SB POWER switch	Q101 and Q102 are set ON when power is ON. Q101 and Q102 are set OFF when power is OFF.
Q103	Fan motor switch	Rotates when power is ON. Does not rotate when power is OFF.
Q104, Q105	Squelch switch	Same as for IC107 through IC110. (See the circuit description.)
Q106, Q108	MUTE switch	Power amplifier muting Q106 is instantaneously set ON when power is switched ON. Q108 is instantaneously set ON when power is switched OFF.
Q107	RESET switch	RESET switch for IC101
D1	Antireverse current lithium cell selection	Lithium cell is OFF when power is supplied.
D2	Voltage compensation	
D3	Backup detection	
D4	Antireverse current	
D5	Reset detection	
D6, D101 ~ D103	Antireverse current	

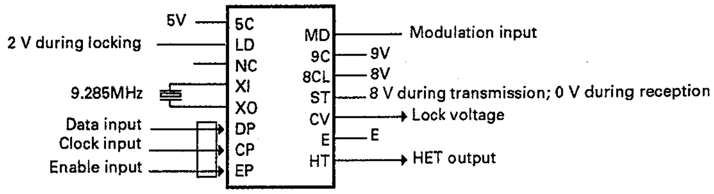
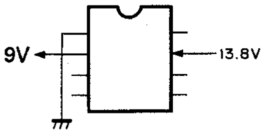
DESCRIPTION OF COMPONENTS

Display Unit (X54-312X-XX) 0-11: 641A(K, P), 0-21:741A(M) 0-22:741A(M2), 2-71:741E(E)

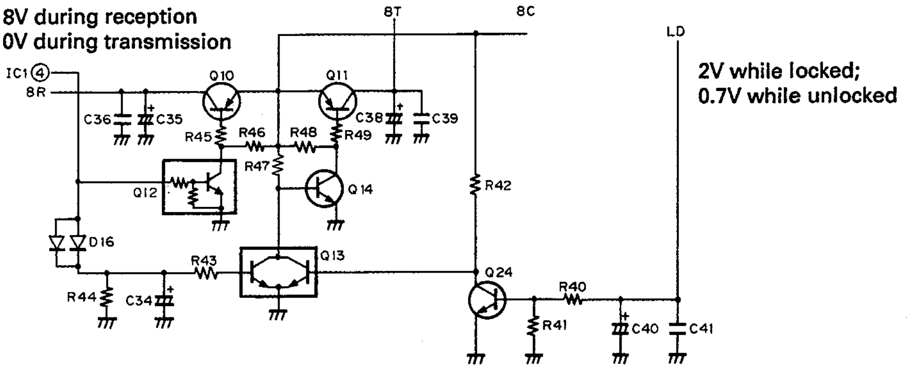
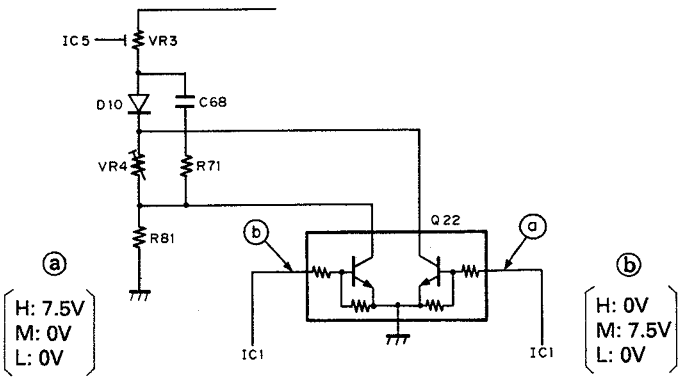
Component	Use/Function	Operation/Condition/Compatibility
IC1	Microprocessor	See Circuit Diagram
IC2, IC3	LCD driver	See Circuit Diagram
IC4	6V AVR	Three Circuit regulator 
IC5, IC6	Serial data inverter Buffer	
IC7	Reset IC	See Circuit Diagram
Q1	Reset switch	
Q2	Lamp AVR	See Circuit Diagram
Q3	Lamp AVR switch	
Q4	Lamp AVR	
Q5	5-V power switch	ON when is ON OFF when power OFF
Q6	INT4 SW	ON: 13.8 V; OFF: 0V
Q7	LED POWER SW	ON when power ON; OFF when power OFF
Q8	Function LED switch	ON when function used

DESCRIPTION OF COMPONENTS

28TX-RX unit (X57-3790-01) UT-28S(M)

Component	Use/Function	Operation/Condition/Compatibility
IC1	Shift register	See Circuit Description.
IC2	VCO, PLL	 5V 2 V during locking 9.285MHz Data input Clock input Enable input 5C LD NC XI XO DP CP EP MD 9C 8CL ST CV E HT Modulation input 9V 8V 8 V during transmission; 0 V during reception Lock voltage E HET output
IC3	Low-frequency amplifier, limiter	Microphone amplifier
IC4	28-MHz band transmission Drive	Operation during transmission 28 - 29.695 MHz ① Input ⑭ Output
IC5	APC	
IC6	Second local oscillator, mixer IF amplifier, detector Low-frequency amplifier Noise detector Squelch switch	① First IF input 8.83 MHz ③ Second local oscillator input 9.285 MHz ⑨ Squelch output, busy signal, 0 V while busy ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF OUT
IC7	9V AVR	
IC8	Out-of-band reception Mixer, RF amplifier	① HET input 2 IF output ③ 8 V (8 V outside band; 0 V within band) ⑤ RF output ⑥ 8 V (8 V within band; 0 V outside band) ⑧ RF input
Q1	High-frequency amplifier	Operation during reception, 28-MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplifier	Operation during reception 8.83 MHz
Q4	ATT switch	ON when ATT is ON
Q5	First mixer selection switch	OFF during out-of-band reception

DESCRIPTION OF COMPONENTS

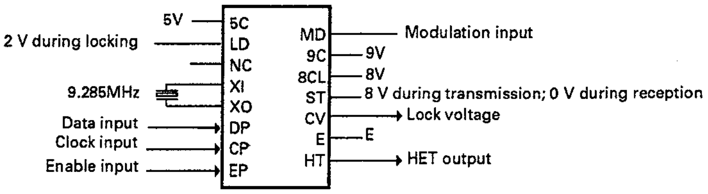
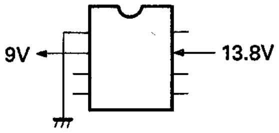
Component	Use/Function	Operation/Condition/Compatibility
Q6~7	In-band/out-of-band power switch	Q6 OFF, Q7 ON: In-band reception; Q6 ON, Q7 OFF: Out-of-band reception
Q8	Second local oscillator buffer	Operation during reception 9.285 MHz
Q9	Squelch hysterisis switch	ON while busy
Q10~Q14 Q24	Transmit/receive power switch	 8V during reception 0V during transmission 8T 8C LD 2V while locked; 0.7V while unlocked IC1④ 8R Q10 Q11 C36 C35 C38 C39 R45 R46 R48 R49 R47 Q12 Q14 R42 D16 R43 Q13 Q24 R40 R44 C34 R41 C40 C41 Q10, Q12, Q13 OFF, Q11, Q14, Q24 ON: During transmission Q10, Q12, Q13, Q24 ON, Q11, Q14 OFF: During reception
Q15~17	Inverter	
Q18	Modulation system mute	ON during reception
Q19	CV line buffer	
Q20	HET output amplifier	28-29.695 MHz: During transmission; 36.83-38.525 MHz: During reception
Q21	2VCO 8V ripple filter	
Q22	Middle (not for 10 W), LOW Power switch	 IC5 VR3 D10 C68 VR4 R71 R81 Q22 ⓑ ⓐ ⓐ H: 7.5V M: 0V L: 0V IC1 IC1 ⓑ H: 0V M: 7.5V L: 0V
Q23	APC control	Operation during transmission
Q25~Q26	AM/FM selection switch	Q25 and Q26 OFF: During FM reception Q25 and Q26 ON: During AM reception

DESCRIPTION OF COMPONENTS

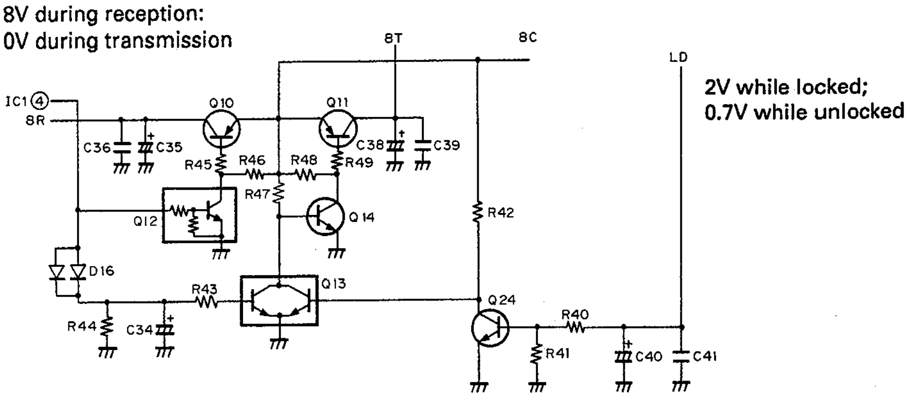
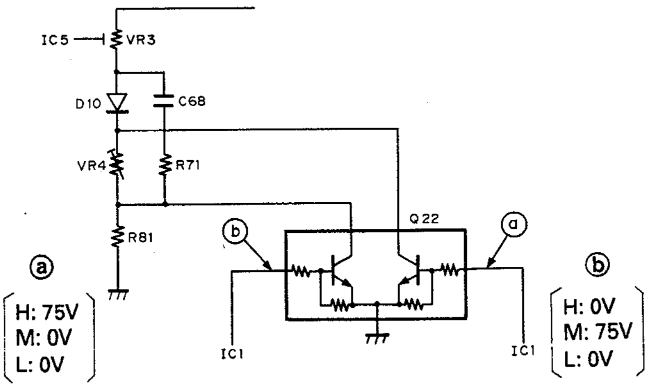
Component	Use/Function	Operation/Condition/Compatibility
Q27	Transmission band selection switch	ON: Narrow OFF: Wide
Q1~2	ATT selection switch	D1 OFF and D2 ON: When ATT ON D1 ON and D2 OFF: When ATT OFF
Q3~Q6	Varicap tuner	
D7	HET selection switch	
D8	Reverse-flow prevention	
D9	HET selection switch	
D10	Temperature compensation	APC
D11, D12	Antenna transmit/receive switch	ON: Transmit; OFF: Receive
D13, D14	Power detection	APC
D15	Reverse-power connection prevention	
D16	Reverse-flow prevention	
D17	Temperature compensation	

DESCRIPTION OF COMPONENTS

50 TX-RX Unit (X57-3800-01) UT-50S(M)

Component	Use/Function	Operation/Condition/Compatibility
IC1	Shift register	See Circuit Description.
IC2	VCO, PLL	 5V 2 V during locking 9.285MHz Data input Clock input Enable input 5C LD NC XI XO DP CP EP MD 9C 8CL ST CV E HT Modulation input 9V 8V 8 V during transmission; 0 V during reception Lock voltage E HET output
IC3	Low-frequency amplifier, limiter	Microphone amplifier
IC4	50 MHz band transmission Drive	Operation during transmission 50 - 53.995 MHz ① Input ⑫ Output
IC5	APC	
IC6	Second local oscillator, mixer IF amplifier, detector Low-frequency amplifier Noise detector Squelch switch	① First IF input 10.595 MHz ③ Second local oscillator input 11.05 MHz ⑨ Squelch output, busy signal, 0 V while busy ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF OUT
IC7	9V AVR	
IC8	Out-of-band reception	① HET input 2 IF output ③ 8 V (8 V outside band; 0 V within band)
	Mixer, RF amplifier	⑤ RF output ⑥ 8 V (8 V within band; 0 V outside band) ⑧ RF input
Q1	High-frequency amplifier	Operation during reception, 50 MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplifier	Operation during reception 10.595 MHz
Q4	ATT switch	ON when ATT is ON
Q5	First mixer selection switch	OFF during out-of-band reception

DESCRIPTION OF COMPONENTS

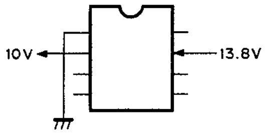
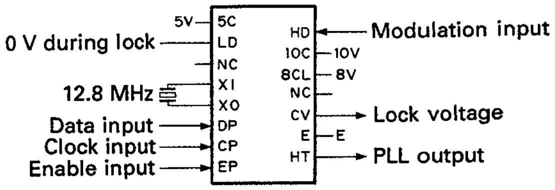
Component	Use/Function	Operation/Condition/Compatibility
Q6~7	In-band/out-of-band power switch	Q6 OFF, Q7 ON: In-band reception; Q6 ON, Q7 OFF: Out-of-band reception
Q8	Second local oscillator buffer	Operation during reception 11.05 MHz
Q9	Squelch hysterisis switch	ON while busy
Q10~Q14 Q24	Transmit/receive power switch	 IC1④ 8R C36 C35 Q10 Q11 8T 8C LD C38 C39 R45 R46 R48 R49 R47 Q12 Q14 R42 D16 R43 Q13 Q24 R40 R44 C34 R41 C40 C41 8V during reception: 0V during transmission 2V while locked; 0.7V while unlocked Q10, Q12, Q13 OFF, Q11, Q14, Q24 ON: During transmission Q10, Q12, Q13, Q24 ON, Q11, Q14 OFF: During reception
Q15~17	Inverter	
Q18	Modulation system mute	ON during reception
Q19	CV line buffer	
Q20	HET output amplifier	50 - 53.995 MHz: During transmission; 60.595 - 64.590 MHz: During reception
Q21	2VCO 8-V ripple filter	
Q22	Middle (not for 10 W), LOW Power switch	 IC5 VR3 D10 C68 VR4 R71 R81 Q22 ⓑ ⓐ IC1 IC1 ⓐ H: 75V M: 0V L: 0V ⓑ H: 0V M: 75V L: 0V
Q23	APC control	Operation during transmission
Q25~Q26	AM/FM selection switch	Q25 and Q26 OFF: During FM reception Q25 and Q26 ON: During AM reception

DESCRIPTION OF COMPONENTS

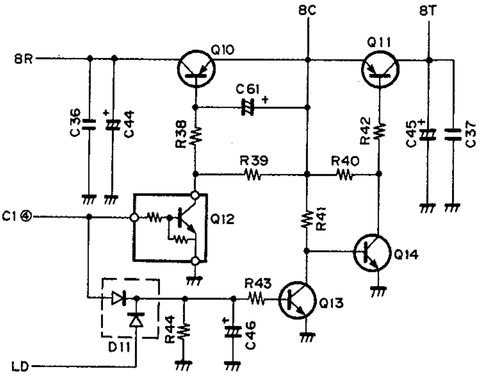
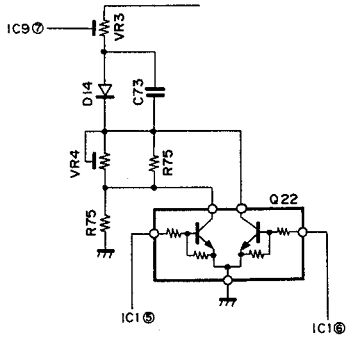
Component	Use/Function	Operation/Condition/Compatibility
D1~D2	ATT selection switch	D1 OFF and D2 ON: When ATT ON D1 ON and D2 OFF: When ATT OFF
D3~D6	Varicap tuner	
D7	HET selection switch	
D8	Reverse-flow prevention	
D9	HET selection switch	
D10	Temperature compensation	
D11, D12	Antenna transmit/receive switch	APC
D13, D14	Power detection	ON: Transmit; OFF: Receive
D15	Reverse-power connection prevention	APC
D16	Reverse-flow prevention	
D17	Temperature compensation	

CIRCUIT DESCRIPTION

144TX-RX Unit (X57-3580-12) TM-641A, 741A, 741E

Reference No.	Function	Description
IC1	Shift register	See the circuit description.
IC2	10V AVR	
IC5	Second local oscillation, mixer, IF amplification, detection, low-frequency amplification, noise amplification, noise detection, and squelch switching	① 10.7 MHz first IF input ③, ④ 10.245 MHz second local oscillation ⑨ 0 V when scan control and busy signals are busy. ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF output
IC7	Low-frequency amplification and limiter	Microphone amplifier
IC8	144 MHz band transmission driver	Operation during transmission. 144 to 148 MHz band ⑭ Input ① Output
IC9	APC	
IC10	Power module	
IC11	VCO.PLL	 5V 0 V during lock 12.8 MHz Data input Clock input Enable input 5C LD NC XI XO DP CP EP HD 10C 8CL NC CV E HT Modulation input 10V 8V Lock voltage E PLL output
Q1	High-frequency amplification	Operation during reception. 144 MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplification	Operation during reception. 10.7 MHz

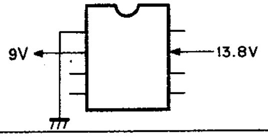
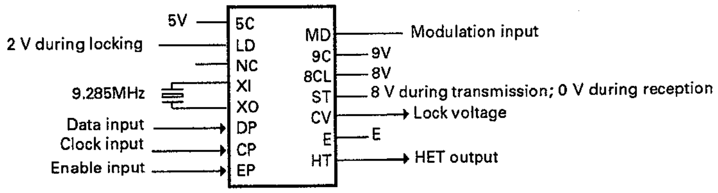
CIRCUIT DESCRIPTION

Reference No.	Function	Description
Q10 ~ Q14	Transmission and reception power selection	 8C 8T 8R Q10 Q11 C61 C36 C44 R38 R42 C45 C37 R39 R40 IC1④ Q12 R41 Q14 R43 Q13 D11 R44 C46 LD (0 V during lock) (Q10, Q12, and Q13 are set "OFF" during transmission. Q11 and Q14 are set "ON" during transmission.) (Q10, Q12, and Q13 are set "ON" during reception. Q11 and Q14 are set "OFF" during reception.)
Q15, Q16, Q17	Inverter	
Q18	Modulation muting	ON during reception
Q19	CV line buffer	144 MHz band
Q20	PLL output amplification	
Q21	PLL 8 V ripple filter	
Q22	Middle/low POWER switch	Middle and low POWER switches are set ON when high.  IC9⑦ VR3 D14 C73 VR4 R75 R75 Q22 IC1⑤ IC1⑥
Q23	APC control	Operation during transmission
Q24	Squelch hysteresis switch	OFF when busy
D1 ~ D7	Varicap diode tuning	
D11	Antireverse current	
D12	Antireverse current	
D13	PLL output switch	
D14	Temperature compensation	APC
D15, D16	Antenna transmission and reception selection	ON during transmission. OFF during reception.
D17, D18	Power detection	APC
D19	Power reverse connection protection	

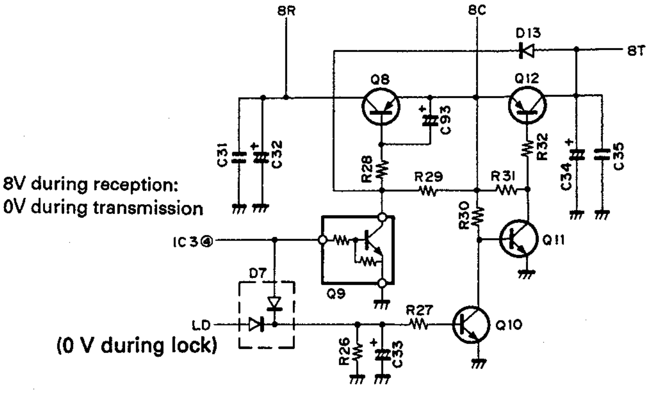
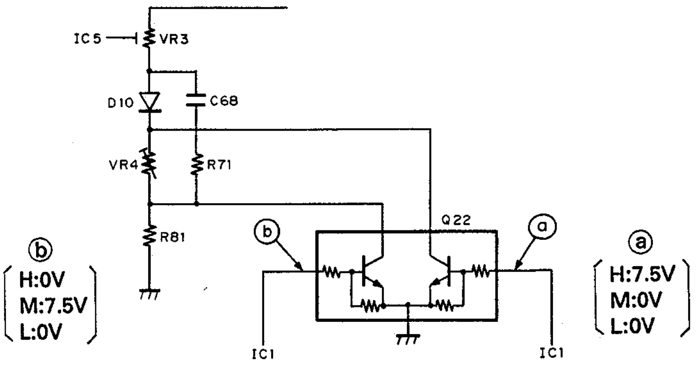
TM-641A/741A/741E

DESCRIPTION OF COMPONENTS

220 TX-RX Unit (X57-3810-10):TM-641A(K), UT-220S(K)

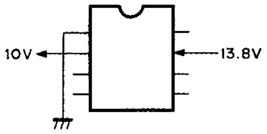
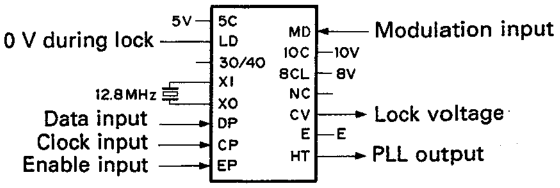
Component	Use/Function	Operation/Condition/Compatibility
IC1	Shift register	See Circuit Description.
IC2	9V AVR	
IC5	Second local oscillator, mixer IF amplifier, detector Low-frequency amplifier Noise detector Squelch switch	① First IF input 30.825 MHz ③ ④ Second local oscillator 30.37 MHz ⑨ Squelch output, busy signal, 0 V while busy ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑭ RD output ⑯ AF OUT
IC7	Low-frequency amplifier, limiter	Microphone amplifier
IC8	220-MHz band transmission Drive	Operation during transmission 220 - 224.995 MHz ① Input ⑫ Output
IC9	APC	 5V 2 V during locking 9.285MHz Data input Clock input Enable input 5C LD NC XI XO DP CP EP MD 9C 8CL ST CV E HT Modulation input 9V 8V 8 V during transmission; 0 V during reception Lock voltage E HET output
IC10	Power module	
IC11	VCO, PLL	
Q1	High-frequency amplifier	Operation during reception, 220 MHz band
Q2	First mixer	Operation during reception
Q3	First IF amplifier	Operation during reception 30.825 MHz

DESCRIPTION OF COMPONENTS

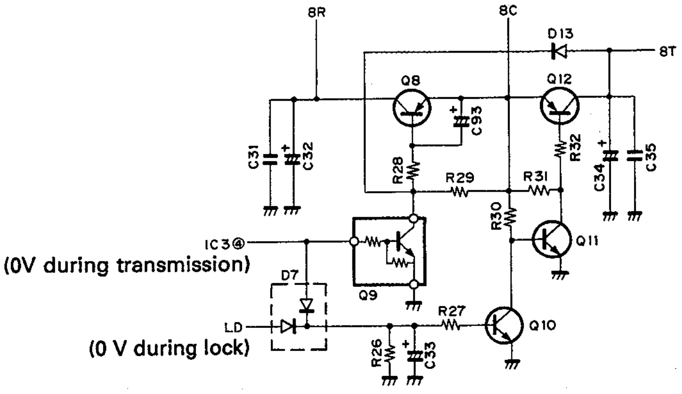
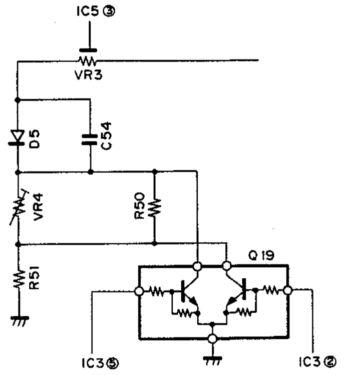
Component	Use/Function	Operation/Condition/Compatibility
Q10~Q14	Transmit/receive power switch	 8R 8C D13 8T Q8 Q12 C93 C31 C32 R28 R29 R31 R32 C34 C35 8V during reception: 0V during transmission R30 Q11 IC3④ Q9 D7 LD (0 V during lock) R27 Q10 R26 C33 Q10, Q12, Q13 OFF, Q11, Q14 ON: During transmission Q10, Q12, Q13, ON, Q11, Q14 OFF: During reception
Q15~Q17	Inverter	
Q18	Modulation system mute	ON during reception
Q19	CV line buffer	
Q20	HET output amplifier	220 - 224.995 MHz: During transmission: 189.175 - 194.17 MHz: During reception
Q21	VCO 8V ripple filter	
Q22	Middle/low power switch	 IC5 VR3 D10 C68 VR4 R71 R81 Q22 ⓑ ⓐ ⓑ H:0V M:7.5V L:0V ⓐ H:7.5V M:0V L:0V IC1 IC1
Q23	APC control	Operation during transmission
Q24	Squelch hysterisis switch	ON while busy
D3, 5, 7, 20	Varicap tuner	
D11, 12	Reverse-flow prevention	
D13	HET selection switch	
D14	Temperature compensation	APC
D15, 16	Antenna transmit/receive switch	ON: Transmit; OFF: Receive
D17, 18	Power detection	
D19	Reverse-power connection prevention	

DESCRIPTION OF COMPONENTS

430TX-RX Unit (X57-359X-XX)0-12:TM-741A(K, P), UT-440S(K), 0-22 : TM-741A(M, M2) 2-72 : TM-741E (E)

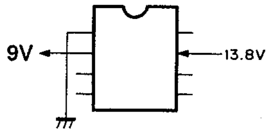
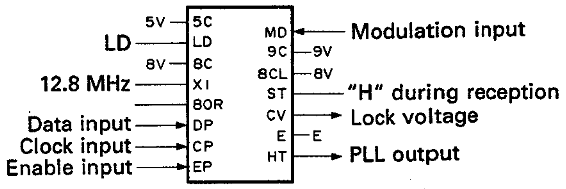
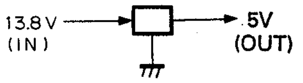
Reference No.	Function	Description
IC1	Second local oscillation, mixer, IF amplification, detection, low-frequency amplification, noise amplification, noise detection, and squelch switching	① 21.6 MHz first IF input ③, ④ 21.145 MHz second local oscillation ⑨ 0 V when scan control and busy signals are busy. ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF output
IC2	Low-frequency amplification and limiter	Microphone amplifier
IC3	Shift register	See the circuit description.
IC4	10V AVR	
IC5	APC	
IC6	430 MHz band transmission driver	① Output ⑮ Input
IC7	Power module	
IC10	VCO.PLL	 5V 5C 0 V during lock LD 30/40 12.8MHz XI XO Data input DP Clock input CP Enable input EP MD Modulation input 10C 10V 8CL 8V NC CV Lock voltage E E HT PLL output
Q1, Q2	High-frequency amplification	Operation during reception
Q3	First mixer	Operation during reception
Q5	First IF amplification	Operation during reception. 21.6 MHz

DESCRIPTION OF COMPONENTS

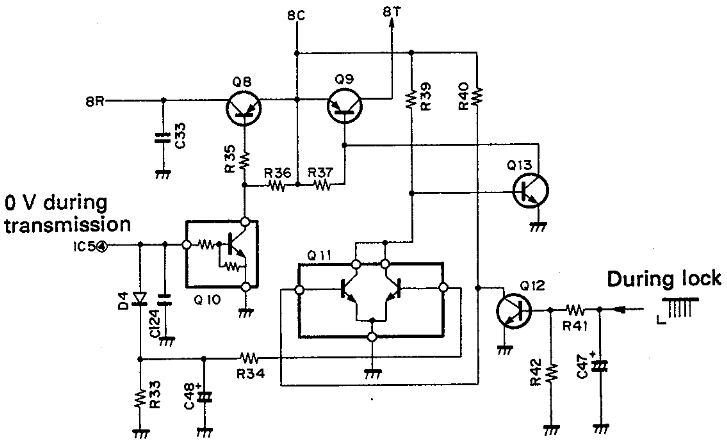
Reference No.	Function	Description
Q8~Q12	Transmission/reception power selection	 8R 8C D13 8T Q8 Q12 C93 C31 C32 R28 R29 R31 R32 C34 C35 R30 IC3④ (0V during transmission) Q9 Q11 D7 LD R27 Q10 (0 V during lock) R26 C33 (Q8, Q9, and Q10 are set "OFF" during transmission. Q11 and Q12 are set "ON" during transmission.) (Q8, Q9, and Q10 are set "ON" during reception. Q11 and Q12 are set "OFF" during reception.)
Q13, Q14, Q15	Inverter	
Q16	Modulation muting	ON during reception
Q17	PLL 8 V ripple filter	
Q18	PLL output amplification	
Q19	Middle/low POWER switch	Middle and low POWER switches are ON when high.  IC5③ VR3 D5 C54 VR4 R50 Q19 R51 IC3⑤ IC3②
Q20	APC control	Operation during transmission
Q21	Squelch hysteresis switch	OFF when busy
D1	Antenna switch	OFF during reception
D4	PLL output switch	
D5	Temperature compensation	APC
D6, D7	Antireverse current	
D8, D9	Antenna transmission/reception selection	ON during transmission
D10,D11	Power detection	APC
D12	Power reverse connection protection	
D13	Antireverse current	8T pulse rise is faster during transmission and reception.
D14	IF level limiter	

DESCRIPTION OF COMPONENTS

1200TX-RX Unit (X57-3600-11) : UT-1200(M)

Reference No.	Function	Description
IC2	Second local oscillation, mixer, IF amplification, detection, low-frequency amplification, noise amplification, noise detection, and squelch switching	① 59.7 MHz first IF input ③, ④ 59.245 MHz second local oscillation ⑨ 0 V when scan control and busy signals are busy. ⑩ Noise detection voltage output (DC) ⑪ Signal-strength meter output ⑫ Detection output ⑭ RD output ⑮ AF output
IC3	ALT	② 8 V ③ "H" during ALT ⑩ Detection input (DC)
IC4	Low-frequency amplification and limiter	Microphone amplifier
IC5	Shift register	See the circuit description.
IC6	9V AVR	
IC7	Predrive	⑩ Input ① Output
IC8	Drive	① Output ⑧ Input
IC9	APC	
IC10	Power module	
IC11	VCO.PLL	 5V LD 8V 12.8 MHz Data input Clock input Enable input 5C LD 8C XI 8OR DP CP EP MD 9C 8CL ST CV E HT Modulation input 9V 8V "H" during reception Lock voltage E PLL output
IC12	5V AVR	Three-terminal regulator  13.8 V (IN) 5V (OUT)
Q1, Q2	High-frequency amplification	Operation during reception
Q3	First mixer	Operation during reception
Q6	Receiving PLL output amplification	Operation during reception
Q7	First IF amplification	Operation during reception. 59.7 MHz

DESCRIPTION OF COMPONENTS

Reference No.	Function	Description
Q8 ~ Q13	Transmission/reception power selection	 8C 8T 8R Q8 Q9 R39 R40 C33 R35 R36 R37 Q13 0 V during transmission IC5④ Q 11 Q 10 Q12 During lock L D4 C124 R34 R41 R33 C48 R42 C47 Q8, Q10, and Q11 (b) are set "OFF" during transmission. Q9, Q12, and Q13 are set "ON" during transmission. Q8, Q10, Q11 (b), and Q12 are set "ON" during reception. Q9, Q11 (a), and Q13 are set "OFF" during reception.
Q15, Q16, Q17	Inverter	
Q18	Modulation muting	ON during reception
Q19, Q20	8T voltage selection	OFF when low
Q21	PLL output amplification	
Q22	Transmitting PLL output amplification	Operation during transmission
Q23	8 V ripple filter	
Q24	APC control	Operation during transmission
Q25	Lower-power switch	ON when high
Q26	Squelch hysteresis switch	OFF when busy
Q28	Q1 POWER switch	ON during transmission
D3	IF level limiter	
D4, D17	Antireverse current	
D5, D15	Constant voltage circuit	
D6	Temperature compensation	APC
D7	Temperature compensation	Drive
D8	Overvoltage prevention	
D9	Power detection	APC
D10 ~ D13	Antenna switch	ON during transmission
D14	Power reverse connection protection	

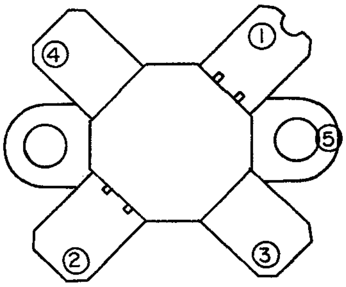
SEMICONDUCTOR DATA

Power Transistor 2SC3240(28 TX-RX Unit)

● Electrical characteristics

Item	Conditions	Maximum value
V_{CBO}		50V
V_{EBO}		5V
V_{CEO}	$R_{BE} = \infty$	20V
IC		25A
P_C	T_C = 25°C	270W
T_j		+175°C
T_{stg}		-55 ~ +175°C
T_a	25 ±3°C	

● External view



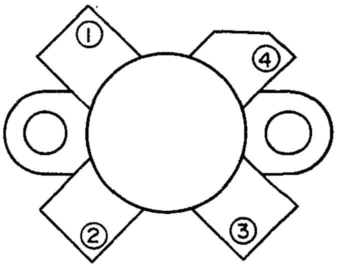
① Collector
② Base
③ Emitter
④ Emitter
⑤ Flange (Emitter)

Power Transistor MRF492 (50 TX-RX Unit)

● Electrical characteristics

Item	Conditions	Maximum value
V_{CBO}		36V
V_{EBO}		4.0V
V_{CEO}		18V
IC		20A
P_D	T_C = 25°C	250W
T_{stg}		-65 ~ +150°C

● External view

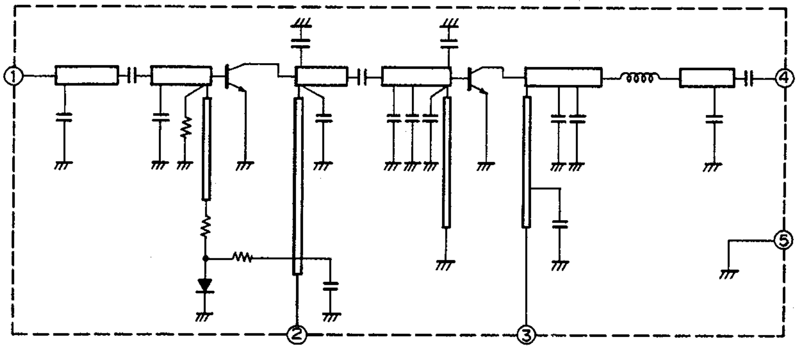


① Emitter
② Base
③ Emitter
④ Collector

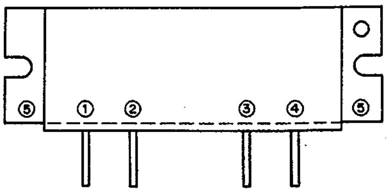
SEMICONDUCTOR DATA

Power module S-AV17 (144 TX-RX UNIT)

● Equivalent circuit diagram



● External view



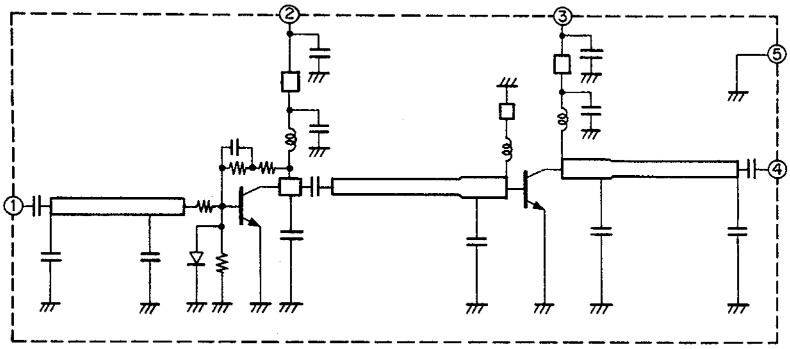
① Input terminal
② First power supply terminal
③ End power supply terminal
④ Output terminal
⑤ Fin (earth)

● Electrical characteristics

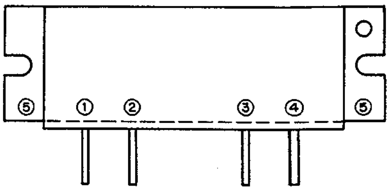
Item	Symbol	Tc (°C)	Conditions	Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			144		148	MHz
Output power	Po	25	Vcc = 12.5V, Pin = 400mW, Zg = Zl = 50Ω			65	W
Combined effeciency	ηT	25	Same as above	45			%
Harmonics	HRM	25	Same as above		-30	-25	dB

Power module M57774 (220 TX-RX UNIT)

● Equivalent circuit diagram



● External view



① Input terminal
② First power supply terminal
③ End power supply terminal
④ Output terminal
⑤ Fin (earth)

● Electrical characteristics

Item	Symbol	Tc (°C)	Conditions	Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			220		225	MHz
Output power	Po	25	Vcc = 12.5V, Pin = 0.3W, Zg = Zl = 50Ω	30	33	40	W
Combined effeciency	ηT	25	Same as above	43	48		%
Secondary spurious strength		25	Same as above			-30	dB
Tertiary spurious strength		25	Same as above			-35	dB

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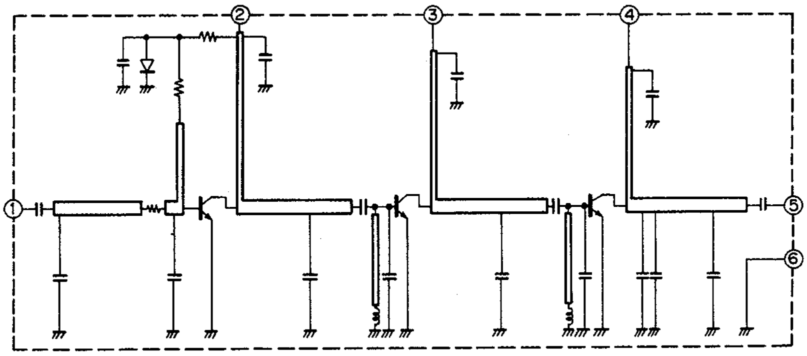
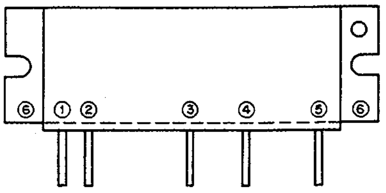
SEMICONDUCTOR DATA

Power module M57788M(430 TX-RX UNIT)

- **Equivalent circuit diagram**



- **External view**



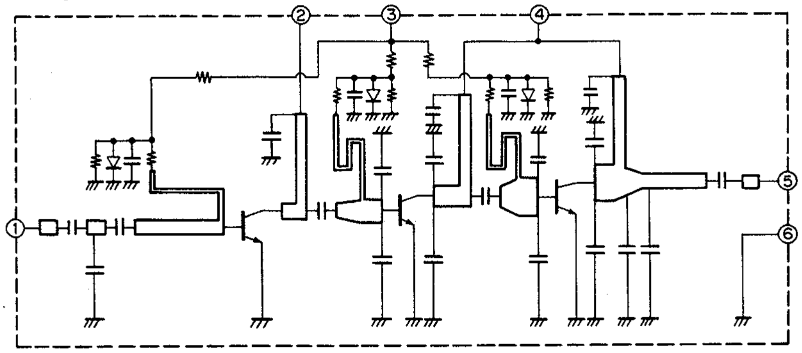
① Input terminal
② First power supply terminal
③ Driver power supply terminal
④ End power supply terminal
⑤ Output terminal
⑥ Fin (earth)

- **Electrical characteristics**

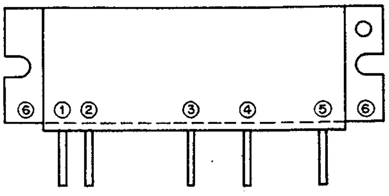
Item	Symbol	Tc (°C)	Conditions	Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			430		450	MHz
Output power	Po	25	Vcc = 12.5V, Pin = 400mW, Zg = Zl = 50Ω	40	45		W
Combined effeciency	ηT	25	Same as above	40	45		%
Secondary spurious strength		25	Same as above			-30	dB
Tertiary spurious strength		25	Same as above			-30	dB

Power module M67711 (1200 TX-RX UNIT)

- **Equivalent circuit diagram**



- **External view**



① Input terminal
② First power supply terminal
③ Driver power supply terminal
④ End power supply terminal
⑤ Output terminal
⑥ Fin (earth)

- **Electrical characteristics**

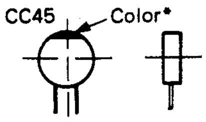
Item	Symbol	Tc (°C)		Standard value			Unit
				Minimum	Standard	Maximum	
Frequency	f			1.24		1.3	GHz
Output power	Po	25	Vcc = 12.5 V, Vbb = 10 V Pin = 1 W, Zg = Z1 = 50Ω	16	17		W
Combined effeciency	ηT	25	Same as above	30	35		%
Secondary spurious strength		25	Same as above			-45	dB

PARTS LIST

CAPACITORS CC 45 TH 1H 220 J

1 2 3 4 5 6

1 = Type ...... ceramic, electrolytic, etc. 4 = Voltage rating
2 = Shape ......round, square, etc. 5 = Value
3 = Temp. coefficient 6 = Tolerance



- Capacitor value

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF
1 0 3 = 0.01μF

2 2 0 = 22pF
1st number | Multiplier
2nd number

- Temperature Coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	–80	–150	–220	–330	–470	–750

2nd Word	G	H	J	K	L
ppm/°C	± 30	± 60	± 120	± 250	± 500

Example CC45TH = –470 ± 60 ppm/°C

- Tolerance

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+ 40 –20	+ 80 –20	+ 100 –0	More than 10μF–10~+50 Less than 4.7μF–10~+75

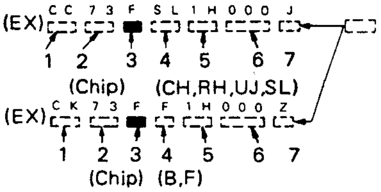
Code	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

Less than 10 pF

- Rating voltage

2nd word / 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	–
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	–
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	–

- Chip capacitors



→ Refer to the table above.

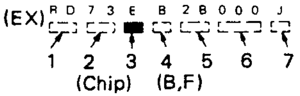
1 = Type ...... ceramic, electrolytic, etc.
2 = Shape ...... round, square, etc.
3 = Dimension
4 = Temp. coefficient
5 = Voltage rating
6 = Value
7 = Tolerance.

Dimension

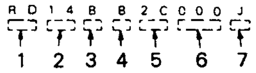
Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

RESISTORS

- Chip resistor (Carbon)



- Carbon resistor (Normal type)



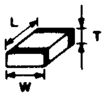
Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

Rating wattage

Cord	Wattage	Cord	Wattage	Cord	Wattage
2A	1 /10W	2E	1/ 4W	3A	1W
2B	1/ 8W	2H	1/ 2W	3D	2W
2C	1/ 6W				

Dimension



TM-641A/741A/741E

PARTS LIST

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
				TM-641A		
1	1D		A01-2006-03	METALLIC CABINET(UPSIDE)		
2	3F		A01-2048-03	METALLIC CABINET(BOTTOM)		
3	2J	*	A62-0128-03	PANEL ASSY		
4	1J		A82-0001-12	BACK PANEL		
5	3J		B03-0562-04	DRESSING PLATE		
7	4L		B11-1002-04	FILTER		
9	2B		B41-0679-04	CAUTION LABEL		
10	2F		B41-0686-04	CAUTION LABEL(ADJUST)		
11	3A,4A		B42-2455-04	LABEL		
12	3A,4A		B42-3343-04	LABEL(S/NO)		
13	4A		B42-3394-14	LABEL(FCC)		
14	3A,4A	*	B42-3498-04	LABEL(SP,ANT)		
15	3Q		B44-2163-04	UPC CODE LABEL(ITEM CARTON)		
-			B44-2165-04	UPC CODE LABEL(OUTER CARTON)		
17	1Q		B46-0410-30	WARRANTY CARD		
18	2P		B58-1001-00	CAUTION CARD		
21	1Q		B59-0441-00	SUB-INSTRUCTION MANUAL		
22	1P	*	B62-0082-10	INSTRUCTION MANUAL		
23	3A,4A	*	B72-0286-04	MODEL NAME PLATE(TM-641A)		
24	2J		D10-0607-04	LEVER		
25	1K		D32-0415-04	STOPPER		
26	2E		E23-0676-04	TERMINAL		
27	1C,2A		E30-3005-05	CONNECTING WIRE(COMMON-PANEL)		
-			E30-3006-08	CURL CORD		
30	2P		E30-3034-05	DC POWER CORD(ACSY)		
31	2D		E37-0006-05	CONNECTING WIRE(SPEAKER)		
32	3G		E37-0007-05	FLAT CABLE(COMMON)		
33	2H		F01-0977-13	HEAT SINK(COMMON AVR)		
34	2I		F01-0978-04	HEAT SINK		
-			F05-2036-05	FUSE(20A)		
36	3N		F07-1203-13	COVER(FAN)		
37	1B		F07-1204-04	COVER(PANEL)		
38	3P		F51-0017-05	FUSE(15A,ACSY)		
39	2J		G01-0854-04	COMPRESSION SPRING		
40	3J		G02-0505-05	LEAF SPRING		
41	1G		G02-0716-04	FLAT SPRING(SPEAKER)		
42	3J		G09-0405-05	SPRING(KNOB)		
43	2H		G10-0635-04	NON-WOVEN FABRIC(19X19)		
44	2E		G10-0663-04	NON-WOVEN FABRIC(100X85)		
46	2D,4F		G10-0684-04	NON-WOVEN FABRIC(130X10)		
48	2B,2C		G10-0700-04	NON-WOVEN FABRIC(60X10)		
49	2K		G10-0708-04	NON-WOVEN FABRIC(BACK PANEL)		
50	2E		G10-0709-04	NON-WOVEN FABRIC		
51	1L		G11-0651-04	SHEET		
52	2B		G11-0653-04	SHEET		
53	3G		G11-0658-04	SHEET(10X5)		
54	2L		G11-0664-03	SHEET		
55	1J		G13-0921-04	CUSHION(BACK PANEL)		
56	2M		G13-0967-04	CUSHION(VERTICAL 3 KEY)		
57	2N		G13-0968-04	CUSHION(8 KEY)		
58	3K		G13-0969-04	CUSHION(3 KEY)		

L:Scandinavia	**K:**USA	**P:**Canada
Y:PX(Far East, Hawaii)	**T:**England	**E:**Europe
Y:AAFES(Europe)	**X:**Australia	**M:**Other Areas

⚠ indicates safety critical components.

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TM-641A

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59	4C		G13-1302-04	CUSHION		
60	2D,3F		G53-0508-04	NON-WEVEN FABRIC(30X10)		
61	1H		G53-0511-04	NON-WEVEN FABRIC(COMMON)		
62	3P		H10-2696-02	POLYSTYRENE FORMED FIXTURE		
63	1P		H11-0830-04	PACKING FIXTURE		
67	2P		H25-0029-04	PROTECTION BAG(MIC HOOK SCREW		
68	2P		H25-0079-04	PROTECTION BAG(200X200)		
69	2Q		H25-0723-04	PROTECTION BAG(230X400)		
70	3Q	*	H52-0198-04	ITEM CARTON BOX		
-		*	H62-0168-04	OUTER CARTON BOX		
72	2K		J19-1477-04	LED HOLDER		
73	2K		J19-1496-04	HOLDER(VFO,MR,MHZ)		
74	2P		J20-0319-24	MIC FOOK(ACSY)		
75	4N		J21-4308-14	MOUNTING HARDWARE(FAN)		
76	2J		J21-4309-14	MOUNTING HARDWARE(LEVER)		
78	2F		J21-4352-03	MOUNTING HARDWARE		
79	2Q		J29-0454-03	WIRING BOARD		
80	2F		J42-0452-05	BUSHING		
81	4C		J42-0470-03	MIC CORD BUSHING		
82	1M		K27-3078-04	KNOB(BUTTON)　VFO		
83	1M		K27-3079-04	KNOB(BUTTON)　MR		
84	1M		K27-3080-04	KNOB(BUTTON)　MHZ		
85	4K		K27-3092-04	KNOB(BUTTON)　RELEASE		
86	3L		K27-3108-04	KNOB(BUTTON)　POWER		
87	3K		K27-3109-04	KNOB(BUTTON)　CONT-SEL		
88	1O		K27-3110-04	KNOB(BUTTON)　CALL		
89	1O		K27-3111-04	KNOB(BUTTON)　F		
91	1O		K27-3113-04	KNOB(BUTTON)　TONE		
92	1O		K27-3114-04	KNOB(BUTTON)　REV		
93	1O		K27-3115-04	KNOB(BUTTON)　DTSS		
94	1O		K27-3116-04	KNOB(BUTTON)　LOW		
95	1O		K27-3117-04	KNOB(BUTTON)　MUTE		
96.	1O		K27-3118-04	KNOB(BUTTON)　SHIFT		
97	3J		K29-3156-04	KNOB		
98	3J		K29-4575-04	KNOB　VOL		
99	3J		K29-4576-04	KNOB　SQL		
-			L15-0310-25	LOW-FREQUENCY CHOKE COIL		
A	2E		N09-2084-05	SCREW(+)		
B	3B		N30-3030-46	PAN HEAD MACHINE SCREW(UNIT		
C	1E,2F		N33-2606-45	OVAL HEAD MACHINE SCREW(CABE		
D	3N		N33-2614-45	OVAL HEAD MACHINE SCREW(FAN		
F	1L		N38-2050-45	SCREW(RELEASE)		
G	2P		N46-3010-46	PAN HEAD TAPPING SCREW(MIC HOO		
H	1K		N80-2006-45	PAN HEAD TAPTITE SCREW(PANEL)		
I	1D,2E		N86-2606-45	SCREW		
J	1H,4H		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
K	2H		N87-2608-46	BRAZIER HEAD TAPTITE SCREW		
L	2D,3E		N88-2606-46	FLAT HEAD TAPTITE SCREW(UNIT)		
M	3P		N99-0331-05	SCREW SET(ACSY)		
-			RD14DB3A220J	REGISTOR　22　J　1W		
SP1	2D		T07-0268-05	SPEAKER		
MFAN	4N		T42-0310-05	FAN MOTOR		

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Y:PX(Far East, Hawaii)　**T:**England　**E:**Europe
Y:AAFES(Europe)　**X:**Australia　**M:**Other Areas

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TM-641A/741A/741E

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TM-641A
TM-741A/E

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
102	1P		T91-0397-05	MICROPHONE		
105	2P		W01-0414-04	SPANNER(ACSY)		
107	2J,3G		X53-3310-12	CONTROL UNIT		
108	2L		X54-3120-11	DISPLAY UNIT		
113	2F		X57-3580-12	TX-RX UNIT(144M 50W)		
115	3F		X57-3810-10	TX-RX UNIT(220M 25W)		
120	3K		490-0160-05	PROTECTION SHEET(FRONT GLASS)		
				TM-741A/E		
1	1D		A01-2006-03	METALLIC CABINET(UPSIDE)		
2	3F	*	A01-2048-03	METALLIC CABINET(BOTTOM)		
3	2J	*	A62-0086-03	PANEL ASSY(TM-741A)	KPMM2	
3	2J	*	A62-0087-03	PANEL ASSY(TM-741E)	E	
4	1J		A82-0001-12	BACK PANEL		
5	3J		B03-0562-04	DRESSING PLATE		
7	4L		B11-1002-04	FILTER		
9	2B		B41-0679-04	CAUTION LABEL		
10	2F		B41-0686-04	CAUTION LABEL		
11	3A,4A		B42-2455-04	LABEL		
12	3A,4A		B42-3343-04	LABEL(S/NO)		
13	4A		B42-3394-04	LABEL(FCC)	KP	
14	3A,4A	*	B42-3484-04	LABEL(SP,ANT)	KP	
14	3A,4A	*	B42-3485-04	LABEL(SP,ANT)	EMM2	
15	3Q		B44-2163-04	UPC CODE LABEL(ITEM CARTON)		
-			B44-2165-04	UPC CODE LABEL(OUTER CARTON)		
17	1Q		B46-0410-30	WARRANTY CARD	K	
17	1Q		B46-0419-00	WARRANTY CARD	E	
17	1Q		B46-0422-00	WARRANTY CARD	P	
18	2P		B58-1001-00	CAUTION CARD		
21	1Q	*	B59-0441-00	SUB-INSTRUCTION MANUAL		
22	1P	*	B62-0082-10	INSTRUCTION MANUAL	K	
22	1S,3S	*	B62-0083-00	INSTRUCTION MANUAL	PEMM2	
22	3S	*	B62-0084-00	INSTRUCTION MANUAL	E	
23	3A,4A	*	B72-0166-04	MODEL NAME PLATE(TM-741A)	KP	
23	3A,4A	*	B72-0167-04	MODEL NAME PLATE(TM-741A)	MM2	
23	3A,4A	*	B72-0168-04	MODEL NAME PLATE(TM-741E)	E	
24	2J		D10-0607-04	LEVER		
25	1K		D32-0415-04	STOPPER		
26	2E		E23-0676-04	TERMINAL		
27	1C,2A		E30-3005-05	CONNECTING WIRE(COMMON-PANEL)		
-			E30-3006-08	CURL CORD		
30	2P		E30-3034-05	DC CORD		
31	2D		E37-0006-05	CONNECTING WIRE(SPEAKER)		
32	3G		E37-0007-05	FLAT CABLE(COMMON)		
33	2H	*	F01-0977-13	HEAT SINK(COMMON AVR)		
34	2I		F01-0978-04	HEAT SINK		
-			F05-2036-05	FUSE(20A)		
36	3N	*	F07-1203-13	COVER(FAN)		
37	1B		F07-1204-04	COVER(PANEL)		
38	3P	*	F51-0017-05	FUSE(15A,ACSY)		
39	2J		G01-0854-04	COMPRESSION SPRING		

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PARTS LIST

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TM-741A/E

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40	3J		G02-0505-05	LEAF SPRING		
41	1G	*	G02-0716-04	FLAT SPRING(SPEAKER)		
42	3J		G09-0405-05	SPRING(KNOB)		
43	2H		G10-0635-04	NON-WOVEN FABRIC(19X19)		
44	2E		G10-0663-04	NON-WOVEN FABRIC(100X85)		
46	2D,4F		G10-0684-04	NON-WOVEN FABRIC(130X10)		
-			G10-0694-04	NON-WOVEN FABRIC		
48	2B,2C		G10-0700-04	NON-WOVEN FABRIC(60X10)		
49	2K		G10-0708-04	NON-WOVEN FABRIC(BACK PANEL)		
50	2E		G10-0709-04	NON-WOVEN FABRIC		
51	1L		G11-0651-04	SHEET		
52	2B		G11-0653-04	SHEET		
53	3G		G11-0658-04	SHEET(10X5)		
54	2L		G11-0664-03	SHEET		
55	1J		G13-0921-04	CUSHION(BACK PANEL)		
56	2M		G13-0967-04	CUSHION(3 KEY)		
57	2N		G13-0968-04	CUSHION(8 KEY)		
58	3K		G13-0969-04	CUSHION(3 KEY)		
59	3C		G13-1302-04	CUSHION		
60	2D,3F		G53-0508-04	NON-WEVEN FABRIC(30X10)		
61	1H		G53-0511-04	NON-WEVEN FABRIC(COMMON)		
62	3P,2S		H10-2696-02	POLYSTYRENE FORMED FIXTURE		
63	1P		H11-0830-04	PACKING FIXTURE	K	
64	3R	*	H11-0856-14	POLYSTYREN PLATE	E	
65	2R	*	H11-0857-14	POLYSTYREN PLATE	E	
66	1S	*	H13-0861-04	PROTECTION BOARD	PMM2	
67	2P		H25-0029-04	PROTECTION BAG	KP	
68	2P		H25-0079-04	PROTECTION BAG(200X200)		
69	2Q		H25-0723-04	PROTECTION BAG(230X400)		
70	3Q	*	H52-0103-04	ITEM CARTON BOX(TM-741A,440M)	KP	
70	3Q	*	H52-0104-04	ITEM CARTON BOX(TM-741A,430M)	MM2	
70	3Q	*	H52-0105-04	ITEM CARTON BOX(TM741E)	E	
-		*	H62-0093-04	OUTER CARTON BOX(TM-741A)	KPMM2	
-		*	H62-0094-04	OUTER CARTON BOX(TM-741E)	E	
72	2K		J19-1477-04	LED HOLDER		
73	2K		J19-1496-04	HOLDER(VFO,MR,MHZ)		
74	2P		J20-0319-24	MIC FOOK(ACSY)	KP	
75	4N	*	J21-4308-14	MOUNTING HARDWARE(FAN)		
76	2J		J21-4309-14	MOUNTING HARDWARE(LEVER)		
78	2F		J21-4352-03	MOUNTING HARDWARE		
79	2Q		J29-0454-03	WIRING BOARD		
80	2F		J42-0452-05	BUSHING		
81	4C		J42-0470-03	MIC CORD BUSHING		
82	1M		K27-3078-04	KNOB(BUTTON) VFO		
83	1M		K27-3079-04	KNOB(BUTTON) MR		
84	1M		K27-3080-04	KNOB(BUTTON) MHZ		
85	4K		K27-3092-04	KNOB(BUTTON) RELEASE		
86	3L		K27-3108-04	KNOB(BUTTON) POWER		
87	3K		K27-3109-04	KNOB(BUTTON)		
88	1O		K27-3110-04	KNOB(BUTTON) CALL		
89	1O		K27-3111-04	KNOB(BUTTON) F		
90	1O		K27-3112-04	KNOB(BUTTON) BELL		
91	1O		K27-3113-04	KNOB(BUTTON) TONE		

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TM-741A/E
UT-28S

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92	1O		K27-3114-04	KNOB(BUTTON) REV		
93	1O		K27-3115-04	KNOB(BUTTON) DTSS		
94	1O		K27-3116-04	KNOB(BUTTON) LOW		
95	1O		K27-3117-04	KNOB(BUTTON) MUTE		
96	1O	*	K27-3118-04	KNOB(BUTTON) SHIFT		
97	3J		K29-3156-04	KNOB		
98	3J		K29-4575-04	KNOB VOL		
99	3J		K29-4576-04	KNOB SQL		
-			L15-0310-25	LOW-FREQUENCY CHOKE COIL		
A	2E		N09-2084-05	SCREW		
B	3B		N30-3030-46	PAN HEAD MACHINE SCREW(UNIT		
C	1E,2F		N33-2606-45	OVAL HEAD MACHINE SCREW(CABE		
D	3N		N33-2614-45	OVAL HEAD MACHINE SCREW(FAN		
F	1L	*	N38-2050-45	SCREW(RELEASE)		
G	2P		N46-3010-46	PAN HEAD TAPPING SCREW(MIC HOO		
H	1K		N80-2006-45	PAN HEAD TAPTITE SCREW(PANEL)		
I	1D,2E		N86-2606-45	SCREW		
J	1H,4H		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
K	2H		N87-2608-46	BRAZIER HEAD TAPTITE SCREW		
L	2D,3E		N88-2606-46	FLAT HEAD TAPTITE SCREW(UNIT)		
M	3P		N99-0331-05	SCREW SET(ACSY)		
-			RD14DB3A220J	REGISTOR 22 J 1W		
SP1	2D		T07-0268-05	SPEAKER		
MFAN	4N		T42-0310-05	FAN MOTOR		
102	1P		T91-0396-05	MICROPHONE	MM2	
102	1P		T91-0397-05	MICROPHONE	KP	
102	1P		T91-0398-05	MICROPHONE	E	
105	2P		W01-0414-04	SPANNER(ACSY)		
107	2I,3G	*	X53-3310-12	CONTROL UNIT	KPMM2	
107	2I,3G	*	X53-3312-71	CONTROL UNIT	E	
108	2W	*	X54-3120-11	DISPLAY UNIT	KP	
108	2W	*	X54-3120-21	DISPLAY UNIT	M	
108	2W	*	X54-3120-22	DISPLAY UNIT	M2	
108	2W	*	X54-3122-71	DISPLAY UNIT	E	
113	2F	*	X57-3580-12	TX-RX UNIT(144M 50W)		
115	3F	*	X57-3590-12	TX-RX UNIT(440M 35W)	KP	
115	3F	*	X57-3590-22	TX-RX UNIT(430M 35W)	MM2	
115	3F	*	X57-3592-72	TX-RX UNIT(430M 35W)	E	
UT-28S						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO,UNIT)		
305	1T		B42-2454-04	LABEL(S/NO,ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	2T,1U		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X110)		
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326	2T	*	H52-0130-04	ITEM CARTON BOX		

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328	3T	*	H62-0110-04	OUTER PACKING CASE		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-05	SCREW SET		
340	1U,2T		X57-3790-01	TX-RX UNIT(28MHZ 50W)		
UT-50S						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO,UNIT)		
305	1T		B42-2454-04	LABEL(S/NO,ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	1U,2T		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X10)		
324	1T,1U	*	H25-0760-04	PROTECTION BAG(200X350)		
326	2T	*	H52-0133-04	ITEM CARTON BOX		
328	3T	*	H62-0113-04	OUTER CARTON BOX		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-05	SCREW SET		
340	1U,2T	*	X57-3800-01	TX-RX UNIT(50M 50W)		
UT-220S						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO,UNIT)		
305	3T		B42-2454-04	LABEL(S/NO,ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	1U,2T		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X110)		
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326	2T	*	H52-0136-04	ITEM CARTON BOX		
328	3T	*	H62-0116-04	OUTER PACKING CASE		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-05	SCREW SET		
340	1U,2T	*	X57-3810-10	TX-RXUNIT(220MHZ 25W)		
UT-440S						
300	1U		B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO,UNIT)		
305	1T		B42-2454-04	LABEL(S/NO,ITEM CARTON BOX)		
309	2U		B42-3488-04	LABEL(FREQUENCY)		
311	1T		B62-0089-10	INSTRUCTION MANUAL		

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UT440S
UT-1200
CONTROL UNIT (X53-331X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
313	2U		E23-0657-04	TERMINAL		
315	1U		G11-0665-04	SHEET(FAN CABLE)		
317	1U,2T		H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T		H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X110)		
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326.	2T	*	H52-0197-04	ITEM CARTON BOX		
328	3T	*	H62-0169-04	OUTER PACKING CASE		
330	1U		J69-0325-05	O RING		
335	1U		N99-0355-05	SCREW SET		
340	1U,2T		X57-3590-12	TX-RXUNIT(440MHZ 35W)		
UT-1200						
300	1U	*	B41-0686-04	CAUTION LABEL(ADJUST)		
303	1T		B42-2437-04	LABEL(S/NO)		
305	1T		B42-2454-04	LABEL(S/NO.ITEM CARTON BOX)		
309	2U	*	B42-3488-04	LABEL(FREQUENCY)		
311	1T	*	B62-0089-10	INSTRUCTION MANUAL		
313	2U		E23-0657-04	TERMINAL		
315	1U	*	G11-0665-04	SHEET(FAN CABLE)		
317	1U,2T	*	H10-2726-03	POLYSTYRENE FOAMED FIXTURE		
320	1T	*	H13-0855-04	PROTECTION BOARD		
322	2U		H25-0029-04	PROTECTION BAG(60X110)		
324	1T,1U		H25-0760-04	PROTECTION BAG(200X350)		
326	2T	*	H52-0112-04	ITEM CARTON BOX		
328	3T	*	H62-0101-04	OUTER CARTON BOX		
330	1U		J69-0325-05	O RING		
335	1U	*	N99-0355-05	SCREW SET		
340	1U,2T		X57-3600-11	TX-RX UNIT(1200MHZ 10W)		
CONTROL UNIT (X53-331X-XX) **0-12:K, P, M, M2 2-71:E**						
C1 -4			CK73FB1H102K	CHIP C 1000PF K		
C5			CK73FB1E104K	CHIP C 0.10UF K		
C6			CK73FF1C105Z	CHIP C 1.0UF Z		
C7			CK73FB1E223K	CHIP C 0.022UF K		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CK73FB1E104K	CHIP C 0.10UF K		
C10			CK73FB1H102K	CHIP C 1000PF K		
C11			CK73FF1C105Z	CHIP C 1.0UF Z		
C12			CK73FB1H102K	CHIP C 1000PF K		
C13			CK73FB1E223K	CHIP C 0.022UF K		
C14			CK73FB1H102K	CHIP C 1000PF K		
C15			CC73FCH1H390J	CHIP C 39PF J		
C16			CC73FCH1H330J	CHIP C 33PF J		
C17 -19			C92-0005-05	ELECTRO 2.2UF 6.3WV		
C20 -28			CK73FB1E104K	CHIP C 0.10UF K		
C29			CK73FF1C105Z	CHIP C 1.0UF Z		
C30			CK73FB1E104K	CHIP C 0.10UF K		
C31			C92-0507-05	CHIP TAN 4.7UF 6.3WV		

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CONTROL UNIT (X53-331X-XX)

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C32 -35			CK73FB1H102K	CHIP C 1000PF K		
C36 ,37			CC73FSL1H101J	CHIP C 100PF J		
C38 -40			CK73FB1H102K	CHIP C 1000PF K		
C41			CE04EW1A101M	ELECTRO 100UF 10WV		
C42			CK73FF1C105Z	CHIP C 1.0UF Z		
C43			CK73FB1H102K	CHIP C 1000PF K		
C44			CK73FB1E103K	CHIP C 0.01UF K		
C45 ,46			CK73FB1H102K	CHIP C 1000PF K		
C47 -49			CK73FB1E104K	CHIP C 0.10UF K		
C50			CK73FF1C105Z	CHIP C 1.0UF Z		
C51			CC73FSL1H101J	CHIP C 100PF J		
C101-103			CK73FB1H102K	CHIP C 1000PF K		
C104			CE04EW1C470M	ELECTRO 47UF 16WV		
C105			CK73FB1H102K	CHIP C 1000PF K		
C106			CE04EW1A470M	ELECTRO 47UF 10WV		
C107,108			CK73FB1E123K	CHIP C 0.012UF K		
C109			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C110			CK73FB1H682K	CHIP C 6800PF K		
C111			CK73FF1C105Z	CHIP C 1.0UF Z		
C112-115			CK73FB1E104K	CHIP C 0.10UF K		
C116			CE04EW1A471M	ELECTRO 470UF 10WV		
C117-120			CE04EW1A470M	ELECTRO 47UF 10WV		
C121			CE04EW1C101M	ELECTRO 100UF 16WV		
C122-125			CE04EW1A470M	ELECTRO 47UF 10WV		
C126			CE04EW1C101M	ELECTRO 100UF 16WV		
C127-129			CK73FB1E104K	CHIP C 0.10UF K		
C130,131			CK73FB1H102K	CHIP C 1000PF K		
C132		*	C90-2167-05	ELECTRO 100UF 16WV		
C133-135			CE04EW1A471M	ELECTRO 470UF 10WV		
C136			CK73FB1H102K	CHIP C 1000PF K		
C137			CK73FB1E123K	CHIP C 0.012UF K		
C138			CE04EW1C470M	ELECTRO 47UF 16WV		
C139			CK73FB1E223K	CHIP C 0.022UF K		
C140,141			CK73FB1E103K	CHIP C 0.01UF K		
C142,143			CK73FB1H102K	CHIP C 1000PF K		
C144			CC73FSL1H101J	CHIP C 100PF J		
C145,146			CK73FF1C105Z	CHIP C 1.0UF Z		
CN1 ,2			E40-5417-05	PIN CONNECTOR (13P)		
CN3			E40-3246-05	PIN CONNECTOR (2P)		
CN4			E40-3248-05	PIN CONNECTOR (4P,PANEL)		
CN5			E40-5188-05	PIN CONNECTOR (11P,DTSS)		
CN6			E40-5183-05	PIN CONNECTOR (6P,DTSS)		
CN7			E40-5343-05	PIN CONNECTOR (9P,CTCSS)		
CN8			E40-5224-05	PIN CONNECTOR (16P)		
CN101-106			E40-5452-05	PIN CONNECTOR (12P)		
CN107,108			E40-5400-05	PIN CONNECTOR (13P)		
CN109			E40-5224-05	PIN CONNECTOR (16P)		
J1			E11-0425-05	PHONE JACK (3.5D)		
J2		*	E08-0876-05	RECTANGULAR RECEPTACLE(8P)		
W1			E33-1871-15	FINISHED WIRE SET		
W2 ,3		*	E33-1943-05	FINISHED WIRE SET		
W201		*	E37-0187-15	CONNECTING WIRE(FAN)		
X1			L77-1333-05	CRYSTAL RESONATOR(4.19MHZ)		

PARTS LIST

⁎ New Parts
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CONTROL UNIT (X53-331X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R1 -3			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R4 -6			RK73FB2A473J	CHIP R 47K J 1/10W		
R7			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R8			R90-0711-05	MULTI-COMP		
R9			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R10			RK73FB2A154J	CHIP R 150K J 1/10W		
R11			RK73FB2A333J	CHIP R 33K J 1/10W		
R12			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R13			RK73FB2A102J	CHIP R 1.0K J 1/10W	E	
R13			RK73FB2A392J	CHIP R 3.9K J 1/10W	KPMM2	
R14			RK73FB2A332J	CHIP R 3.3K J 1/10W	KPMM2	
R14			RK73FB2A682J	CHIP R 6.8K J 1/10W	E	
R15			RK73FB2A183J	CHIP R 18K J 1/10W		
R16			RK73FB2A104J	CHIP R 100K J 1/10W		
R17			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R18			RK73FB2A221J	CHIP R 220 J 1/10W		
R19			RK73FB2A563J	CHIP R 56K J 1/10W		
R20 ,21			RK73FB2A473J	CHIP R 47K J 1/10W		
R22			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R23 -28			RK73FB2A153J	CHIP R 15K J 1/10W		
R29			RK73FB2A684J	CHIP R 680K J 1/10W		
R30			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R31			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R32			RK73FB2A684J	CHIP R 680K J 1/10W		
R33			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R34			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R35			RK73FB2A684J	CHIP R 680K J 1/10W		
R36			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R37			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R38 -40			RK73FB2A104J	CHIP R 100K J 1/10W		
R41			RK73FB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R43			RK73FB2A123J	CHIP R 12K J 1/10W		
R44 -47			RK73FB2A103J	CHIP R 10K J 1/10W		
R48			RK73FB2A683J	CHIP R 68K J 1/10W		
R49			RK73FB2A473J	CHIP R 47K J 1/10W		
R50			RK73FB2A474J	CHIP R 470K J 1/10W		
R51			RK73FB2A124J	CHIP R 120K J 1/10W		
R52			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R53			RK73FB2A224J	CHIP R 220K J 1/10W		
R54			RK73FB2A184J	CHIP R 180K J 1/10W		
R55			RK73FB2A474J	CHIP R 470K J 1/10W		
R56			R92-0670-05	CHIP R 0 OHM		
R57			RK73FB2A223J	CHIP R 22K J 1/10W		
R58			R92-0670-05	CHIP R 0 OHM		
R59			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R60			R92-1291-05	CHIP R 2.7 J 1W		
R61 -63			RK73FB2A474J	CHIP R 470K J 1/10W		
R64 -67			RK73FB2A473J	CHIP R 47K J 1/10W		
R68			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R69			RK73FB2A103J	CHIP R 10K J 1/10W		
R70			RK73FB2A473J	CHIP R 47K J 1/10W		
R71			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R72			RK73FB2A822J	CHIP R 8.2K J 1/10W		
R73			RK73FB2A153J	CHIP R 15K J 1/10W		

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PARTS LIST

⁎ New Parts
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CONTROL UNIT (X53-331X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R74			RK73FB2A473J	CHIP R 47K J 1/10W		
R75 ,76			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R77			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R78			RK73FB2A471J	CHIP R 470 J 1/10W		
R79			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R101			RK73FB2A273J	CHIP R 27K J 1/10W		
R102			RK73FB2A123J	CHIP R 12K J 1/10W		
R103			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R104			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R105			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R106			RK73FB2A561J	CHIP R 560 J 1/10W		
R107			RK73FB2A273J	CHIP R 27K J 1/10W		
R108			RK73FB2A123J	CHIP R 12K J 1/10W		
R109			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R110			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R111			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R112			RK73FB2A561J	CHIP R 560 J 1/10W		
R113			RK73FB2A273J	CHIP R 27K J 1/10W		
R114			RK73FB2A123J	CHIP R 12K J 1/10W		
R115			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R116			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R117			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R118			RK73FB2A561J	CHIP R 560 J 1/10W		
R119			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R120			RK73FB2A103J	CHIP R 10K J 1/10W		
R121			R92-1215-05	CHIP R 470 J 1/2W		
R122-124			RK73FB2A103J	CHIP R 10K J 1/10W		
R125-129			RK73FB2A104J	CHIP R 100K J 1/10W		
R130			RK73FB2A183J	CHIP R 18K J 1/16W		
R131			RK73EB2B183J	CHIP R 18K J 1/16W		
R132,133			RK73FB2A183J	CHIP R 18K J 1/10W		
R134			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R135			RK73FB2A473J	CHIP R 47K J 1/10W		
R136,137			RK73FB2A101J	CHIP R 100 J 1/10W		
R138,139			RK73FB2A473J	CHIP R 47K J 1/10W		
R140,141			RK73FB2A101J	CHIP R 100 J 1/10W		
R142			RK73FB2A473J	CHIP R 47K J 1/10W		
R143-145			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R146			RK73FB2A474J	CHIP R 470K J 1/10W		
R147,148			RK73FB2A183J	CHIP R 18K J 1/10W		
R149			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R150			RK73FB2A474J	CHIP R 470K J 1/10W		
R151,152			RK73FB2A183J	CHIP R 18K J 1/10W		
R153			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R154			RK73FB2A183J	CHIP R 18K J 1/10W		
R155			RK73FB2A183J	CHIP R 18K J 1/10W		
R156			RK73FB2A474J	CHIP R 470K J 1/10W		
R157			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R158			RK73FB2A473J	CHIP R 47K J 1/10W		
R159			RK73FB2A473J	CHIP R 47K J 1/10W		
R160			R92-0685-05	CHIP R 22 J 1/2W		
R161			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R162-169			RK73FB2A473J	CHIP R 47K J 1/10W		
R170			RK73FB2A563J	CHIP R 56K J 1/10W		
R171			RK73FB2A103J	CHIP R 10K J 1/10W		

PARTS LIST

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CONTROL UNIT (X53-331X-XX)
DISPLAY UNIT (X54-312X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R172			RK73FB2A473J	CHIP R 47K J 1/10W		
R173,174			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R175-177			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R178			R92-0670-05	CHIP R 0 OHM		
D1			1SS184	DIODE		
D2			LFB01	DIODE		
D3			02CZ6.8(X)	DIODE		
D4			LFB01	DIODE		
D5			02CZ3.0(Z)	DIODE		
D6			LFB01	DIODE		
D101-103			1SS226	DIODE		
IC1		*	75517GF-014-3B9	IC(CPU)		
IC2			LC3564PML-12,15	IC(64K RAM/MEMORY BACK UP)		
IC3			TA78L06F	IC(6V AVR)		
IC4 ,5			TC9154AP	IC(2CH ELECTRONIC VOLUME)		
IC6 ,7			BU4094BF	IC(SHIFT REGISTOR)		
IC8 ,9			BU4053BF	IC(ANALOG SWITCH)		
IC10			NJM4558E	IC(AF AMP ADDER)		
IC11,12			TC4S11F	IC(2 INPUT NAND GATE)		
IC101			CXD1095Q	IC(I/O EXPANDER)		
IC102			MC78T08CT	IC(8V AVR)		
IC103			NJM4558E	IC(ADDER)		
IC104,105			LA4446	IC(AF PA)		
IC106			BU4053BF	IC(ANALOG SW)		
IC107-110			BU4066BF	IC(ANALOG SWITCH X4)		
Q1			2SC3324(G)	TRANSISTOR		
Q2			2SC2712(Y)	TRANSISTOR		
Q3			DTC114EK	DIGITAL TRANSISTOR		
Q4 -8			2SC2712(Y)	TRANSISTOR		
Q9 -11			DTC114EK	DIGITAL TRANSISTOR		
Q12			2SC1757K	TRANSISTOR		
Q13 -15			2SD1757(K)	TRANSISTOR		
Q16			2SA1519	TRANSISTOR		
Q17			2SC2712(Y)	TRANSISTOR		
Q101			2SC2712(Y)	TRANSISTOR		
Q102			2SA1641(S,T)	TRANSISTOR		
Q103			DTD143EK	DIGITAL TRANSISTOR		
Q104,105			DTC114EK	DIGITAL TRANSISTOR		
Q106			DTC144EK	DIGITAL TRANSISTOR		
Q107			2SC2712(Y)	TRANSISTOR		
Q108			DTA144EK	DIGITAL TRANSISTOR		
BA1	3H		W09-0573-05	LITHIUM BATTERY		
DISPLAY UNIT (X54-312X-XX) **0-11:K, P 0-21:M 0-22:M2 2-71:E**						
			B11-0487-05	FILTER(LCD)		
			B11-0500-15	FILTER(KNOB)		
		*	B11-1026-04	FILTER(LCD)		
		*	B38-0357-05	LCD		
PL1 -6			B30-0865-15	LAMP		
C1			C92-0038-05	ELECTRO 22UF 16WV		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3		*	C92-0048-05	ELECTRO 100UF 6.3WV		
C4 ,5			CK73FB1H102K	CHIP C 1000PF K		
C7			CK73FB1E223K	CHIP C 0.022UF K		

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DISPLAY UNIT (X54-312X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C8			CK73FB1H102K	CHIP C 1000PF K		
C9 ,10			CC73FSL1H101J	CHIP C 100PF J		
C11			CK73FB1E223K	CHIP C 0.022UF K		
C12			CK73FB1H102K	CHIP C 1000PF K		
C13			CK73FB1E103K	CHIP C 0.01UF K		
C14 ,15			CC73FCH1H330J	CHIP C 33PF J		
C16 ,17			CC73FCH1H150J	CHIP C 15PF J		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CK73FF1C105Z	CHIP C 1.0UF Z		
C20			CK73FB1H102K	CHIP C 1000PF K		
C21			CK73FB1E103K	CHIP C 0.01UF K		
C22			CK73FB1H102K	CHIP C 1000PF K		
C23			CK73FB1E103K	CHIP C 0.01UF K		
C101-104			CK73FB1E103K	CHIP C 0.01UF K		
C201-204			CK73FB1E103K	CHIP C 0.01UF K		
C301-304			CK73FB1E103K	CHIP C 0.01UF K		
			E29-0500-14	CONNECTOR		
			E37-0264-05	FLAT CABLE		
CN1		*	E40-3262-05	PIN CONNECTOR (4P)		
			F20-1088-04	INSULATING BOARD(LITHIUM BATT)		
			J21-4359-25	MOUNTING HARDWARE(LCD)		
			J39-0439-05	LAMP HOLDER		
X1			L77-1397-05	CRYSTAL RESONATOR(4.19MHZ)		
X2			L77-1256-05	CRYSTAL RESONATOR(32.768KHZ)		
			N14-0552-05	NUT(VOLUME)		
			N80-2006-45	PAN HEAD TAPTITE SCREW		
R1		*	R92-1279-05	FIXED RESISTOR		
R2			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R3			RK73FB2A473J	CHIP R 47K J 1/10W		
R4			RK73FB2A563J	CHIP R 56K J 1/10W		
R5			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R6			RK73FB2A103J	CHIP R 10K J 1/10W		
R7			RK73FB2A331J	CHIP R 330 J 1/10W		
R8			R92-1211-05	SOLID R 5.6K J 1/2W		
R9			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R10			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R11			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R12			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R13			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R14			RK73FB2A123J	CHIP R 12K J 1/10W		
R15 -17			RK73FB2A100J	CHIP R 10 J 1/10W		
R18			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R19			RK73FB2A103J	CHIP R 10K J 1/10W		
R20			RK73FB2A473J	CHIP R 47K J 1/10W		
R21			RK73FB2A334J	CHIP R 330K J 1/10W		
R22			RK73FB2A221J	CHIP R 220 J 1/10W		
R23			RK73FB2A391J	CHIP R 390 J 1/10W		
R24			RK73FB2A221J	CHIP R 220 J 1/10W		
R25			RK73FB2A331J	CHIP R 330 J 1/10W		
R26			RK73FB2A221J	CHIP R 220 J 1/10W		
R27			RK73FB2A391J	CHIP R 390 J 1/10W		

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DISPLAY UNIT (X54-312X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R28			RK73FB2A221J	CHIP R 220 J 1/10W		
R29			RK73FB2A331J	CHIP R 330 J 1/10W		
R30			RK73FB2A221J	CHIP R 220 J 1/10W		
R31			RK73FB2A391J	CHIP R 390 J 1/10W		
R32			RK73FB2A221J	CHIP R 220 J 1/10W		
R33			RK73FB2A331J	CHIP R 330 J 1/10W		
R34 ,35			RK73FB2A100J	CHIP R 10 J 1/10W		
R36			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R37			RK73FB2A104J	CHIP R 100K J 1/10W		
R38 ,39			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R40			RK73FB2A223J	CHIP R 22K J 1/10W		
R41 ,42			RK73FB2A100J	CHIP R 10 J 1/10W		
R43 -51			RK73FB2A473J	CHIP R 47K J 1/10W		
R52			RK73FB2A103J	CHIP R 10K J 1/10W		
R53			RK73FB2A333J	CHIP R 33K J 1/10W		
R54			R92-0670-05	CHIP R 0 OHM	KPME	
R55			R92-0670-05	CHIP R 0 OHM	KPE	
R56			R92-0670-05	CHIP R 0 OHM	KPMM2	
R57			R92-0670-05	CHIP R 0 OHM		
R58			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R59 -61			RK73FB2A473J	CHIP R 47K J 1/10W		
R62			RK73FB2A473J	CHIP R 47K J 1/10W	MM2E	
R63 -65			RK73FB2A473J	CHIP R 47K J 1/10W		
R66 -71			RK73FB2A151J	CHIP R 150 J 1/10W		
R72			RK73FB2A473J	CHIP R 47K J 1/10W	KP	
VR101			R23-9407-05	POTENTIOMETER		
VR201			R23-9407-05	POTENTIOMETER		
VR301			R23-9407-05	POTENTIOMETER		
S1		*	S70-0408-05	TACT SWITCH		
S2		*	S62-0412-05	SLIDE SWITCH		
S3 -12		*	S70-0408-05	TACT SWITCH		
S13 -15		*	S70-0409-05	TACT SWITCH		
S16		*	S70-0408-05	TACT SWITCH		
S17	2K		W02-0388-05	ENCODER		
D1 ,2			1SS184	DIODE		
D3			02CZ7.5(X,Y)	DIODE		
D4 -9			B30-2108-05	LED(RED)		
D10			LFB01	DIODE		
IC1		*	75516GF-270-3B9	IC(CPU)		
IC2 ,3		*	MSM5265GS-V1K	IC(LCD DRIVER)		
IC4			TA78L06F	IC(6V AVR)		
IC5 ,6			TC4S11F	IC(INVERTER)		
IC7			S-8054ALR-LN	IC(RESET)		
Q1			2SC2712(Y)	TRANSISTOR		
Q2			2SA1162(Y)	TRANSISTOR		
Q3			2SC2712(Y)	TRANSISTOR		
Q4			2SA1307(Y)	TRANSISTOR		
Q5			2SA1162(Y)	TRANSISTOR		
Q6			2SC2712(Y)	TRANSISTOR		
Q7			2SD1624(S,T)	TRANSISTOR		
Q8			DTA114EK	DIGITAL TRANSISTOR		
BA1			W09-0394-05	LITHIUM BATTERY		

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144M TX-RX UNIT (X57-3580-12)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
			144M TX-RX UNIT (X57-3580-12)			
			A10-1316-01	CHASSIS		
			B42-2437-04	LABEL(S/NO)		
C5			CC73FCH1H040C	CHIP C 4PF C		
C6			CK73FB1H102K	CHIP C 1000PF K		
C7 -9			CK73FB1H102K	CHIP C 1000PF K		
C10			CK73FB1E103K	CHIP C 0.01UF K		
C11			CC73FCH1H0R5C	CHIP C 0.5PF C		
C12			CC73FCH1H151J	CHIP C 150PF J		
C13			CC73FCH1H030C	CHIP C 3PF C		
C14			CC73FCH1H0R5C	CHIP C 0.5PF C		
C15			CC73FCH1H150J	CHIP C 15PF J		
C16			CC73FCH1H020C	CHIP C 2.0PF C		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CC73FCH1H060D	CHIP C 6PF D		
C20			CK73FB1H102K	CHIP C 1000PF K		
C21			CC73FCH1H050C	CHIP C 5PF C		
C22			CK73FB1E103K	CHIP C 0.01UF K		
C23			CK73FB1H102K	CHIP C 1000PF K		
C24			CK73FB1E103K	CHIP C 0.01UF K		
C26			CK73FB1H102K	CHIP C 1000PF K		
C29			CK73FB1E103K	CHIP C 0.01UF K		
C30			CC73FCH1H390J	CHIP C 39PF J		
C31			CC73FCH1H101J	CHIP C 100PF J		
C32			CK73FB1H102K	CHIP C 1000PF K		
C33			CK73FB1E104K	CHIP C 0.10UF K		
C34 ,35			CK73EF1C105Z	CHIP C 1.0UF Z		
C36 ,37			CK73FB1E103K	CHIP C 0.01UF K		
C39			CC73FCH1H010C	CHIP C 1.0PF C		
C44 ,45			CE04NW1C470M	ELECTRO 47UF 16WV		
C46			C92-0504-05	CHIP TAN 0.68UF 20WV		
C47			CE04NW1C470M	ELECTRO 47UF 16WV		
C48			C92-0003-05	CHIP TAN 0.47UF 25WV		
C49			CE04NW1E100M	ELECTRO 10UF 25WV		
C50			CE04NW1C470M	ELECTRO 47UF 16WV		
C51 ,52			CK73FB1E103K	CHIP C 0.01UF K		
C53 ,54			CK73FB1H102K	CHIP C 1000PF K		
C55			CK73EF1C105Z	CHIP C 1.0UF Z		
C56			CC73FUJ1H150J	CHIP C 15PF J		
C57			CK73FB1H102K	CHIP C 1000PF K		
C58			CC73FUJ1H220J	CHIP C 22PF J		
C59 ,60			CK73FB1H102K	CHIP C 1000PF K		
C61			CE04NW1C470M	ELECTRO 47UF 16WV		
C62			CK73FB1H102K	CHIP C 1000PF K		
C63			CK73FB1E103K	CHIP C 0.01UF K		
C64			CE04NW1E100M	ELECTRO 10UF 25WV		
C65		*	CE04NW1A330M	ELECTRO 33UF 10WV		
C66			CK73FB1E103K	CHIP C 0.01UF K		
C67			CK73FB1H102K	CHIP C 1000PF K		
C68			CC73FCH1H100D	CHIP C 10PF D		
C69			CC73FCH1H100D	CHIP C 10PF D		
C70			CK73FB1E103K	CHIP C 0.01UF K		
C71 -73			CK73FB1H102K	CHIP C 1000PF K		

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PARTS LIST

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144M TX-RX UNIT (X57-3580-12)

Ref. No. 参照番号	Address 位　置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕　向	Re-marks 備考
C74			CK73FB1H223K	CHIP C 0.022UF K		
C75			CE04NW1C101M	ELECTRO 100UF 16WV		
C76			CK73EF1C105Z	CHIP C 1.0UF Z		
C77 ,78			CK73FB1H102K	CHIP C 1000PF K		
C79			CK73EF1C105Z	CHIP C 1.0UF Z		
C80			CC73FCH1H050C	CHIP C 5PF C		
C81			CC45SL2H120J	CERAMIC 12PF J		
C82			CK73FB1H102K	CHIP C 1000PF K		
C83			CK45B2H102K	CERAMIC 1000PF K		
C84			CM73F2H330J	CHIP C 33PF J		
C85			CC73FCH1H220J	CHIP C 22PF J		
C86			CC73FCH1H0R5C	CHIP C 0.5PF C		
C87			CC73FCH1H020C	CHIP C 2.0PF C		
C88			CC45SL2H560J	CERAMIC 56PF J		
C89			CC45SL2H470J	CERAMIC 47PF J		
C90 -92			CK73FB1H102K	CHIP C 1000PF K		
C93			CC73FCH1H0R5C	CHIP C 0.5PF C		
C94			CM73F2H300J	CHIP C 30PF J		
C95			CC73FCH1H020C	CHIP C 2.0PF C		
C96			CK73FB1E103K	CHIP C 0.01UF K		
C98			CK73FB1H102K	CHIP C 1000PF K		
C99			CE04NW1E100M	ELECTRO 10UF 25WV		
C100			CK73FB1H102K	CHIP C 1000PF K		
C101			CE04NW1E100M	ELECTRO 10UF 25WV		
C103			CK73FB1H102K	CHIP C 1000PF K		
C104			CK73FB1E103K	CHIP C 0.01UF K		
C105			CK73FB1H223K	CHIP C 0.022UF K		
C110			CC73FCH1H030C	CHIP C 3PF C		
C111			CK73FB1E103K	CHIP C 0.01UF K		
C112			CE04NW1A221M	ELECTRO 220UF 10WV		
C113			CC73FCH1H100D	CHIP C 10PF D		
C114,115			CC73FSL1H101J	CHIP C 100PF J		
C116			CC73FCH1H080D	CHIP C 8PF D		
C119			CE04NW1E100M	ELECTRO 10UF 25WV		
C120-127			CC73FSL1H101J	CHIP C 100PF J		
C128,129			CK73FB1H102K	CHIP C 1000PF K		
C130			CE04EW1C102M	ELECTRO 1000UF 16WV		
TC1			C05-0345-05	TRIMMING CAP 10PF		
			E22-0672-04	TERMINAL BOARD(-)		
			E22-0673-04	TERMINAL BOARD(+)		
			E30-2145-05	ANT CABLE		
			E30-3007-05	DC POWER CORD		
CN1 ,2			E40-5461-05	PIN CONNECTOR		
J1			E11-0442-05	PHONE JACK		
J3			E23-0619-05	TERMINAL		
			F05-1531-05	FUSE		
			F10-1446-04	SHIELDING PLATE		
		*	F10-2010-03	SHIELDING COVER		
			F10-2012-04	SHIELDING CASE(VCO-PLL)		
			F20-1008-04	INSULATION SHEET(APC)		
		*	F51-0017-05	FUSE(15A)		
			G02-0600-14	FLAT SPRING(THERMAL SW)		
			G02-0705-04	FLAT SPRING		

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144M TX-RX UNIT (X57-3580-12)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
			G02-0715-04	LEAF SPRING(APC TR)		
			G02-0718-04	FLAT SPRING(VCO)		
			G09-0426-05	SPRING(DC CORD)		
			G11-0654-04	CUSHION(VCO)		
			G11-0655-04	CUSHION(CN1,CN2)		
			G11-0660-04	CUSHION(VCO)		
			G11-0661-04	INSULATION SHEET(APC TR)		
			G13-0841-04	FORMED PLATE(XTAL)		
			G13-1325-04	FORMED PLATE(VCO)		
			G13-1337-04	CUSHION(VCO)		
			G13-1349-04	CUSHION(VCO)		
			G53-0508-04	NON-WOVEN FABRIC		
			J30-0564-05	SPACER		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1 -4			L34-4252-05	COIL		
L5			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L6			L34-4251-05	COIL(1ST IF)		
L8			L34-1185-05	COIL(2.5T)		
L10			L40-3382-19	SMALL FIXED INDUCTOR(0.33UH)		
L11			L34-1239-05	COIL(10.5T)		
L12			L34-0895-05	COIL(6T)		
L13			L34-0742-05	COIL(6T)		
L14			L34-0908-05	COIL(9.5T)		
L15 -17			L34-0499-05	COIL(4.5T)		
L19			L40-8272-48	SMALL FIXED INDUCTOR(82NH)		
L20			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
X1			L77-1405-05	CRYSTAL RESONATOR(12.8MHZ)		
X2			L77-1473-05	CRYSTAL RESONATOR(10.245MHZ)		
XF1			L71-0228-05	CRYSTAL FILTER(10.7MHZ)		
			N09-2077-05	SCREW(MODULE)		
			N87-2606-46	BRAZIER HEAD TAPTITE SCREW(ANT		
			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R4			RK73FB2A103J	CHIP R 10K J 1/10W		
R5			RK73FB2A333J	CHIP R 33K J 1/10W		
R6			RK73FB2A274J	CHIP R 270K J 1/10W		
R7			RK73FB2A101J	CHIP R 100 J 1/10W		
R8			RK73FB2A103J	CHIP R 10K J 1/10W		
R9			RK73FB2A101J	CHIP R 100 J 1/10W		
R10 -12			RK73FB2A103J	CHIP R 10K J 1/10W		
R13			RK73FB2A473J	CHIP R 47K J 1/10W		
R14			RK73FB2A104J	CHIP R 100K J 1/10W		
R15			RK73FB2A683J	CHIP R 68K J 1/10W		
R16			RK73FB2A823J	CHIP R 82K J 1/10W		
R17			R92-0670-05	CHIP R 0 OHM		
R18			RK73FB2A470J	CHIP R 47 J 1/10W		
R19			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R20			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R21			RK73FB2A471J	CHIP R 470 J 1/10W		
R22			RK73FB2A101J	CHIP R 100 J 1/10W		
R23			RK73FB2A103J	CHIP R 10K J 1/10W		
R24			RK73FB2A473J	CHIP R 47K J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		

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TM-641A/741A/741E

PARTS LIST

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144M TX-RX UNIT (X57-3580-12)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R30			R92-0670-05	CHIP R 0 OHM		
R31			RK73FB2A394J	CHIP R 390K J 1/10W		
R33 ,34			R92-0670-05	CHIP R 0 OHM		
R35			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R36			RK73FB2A101J	CHIP R 100 J 1/10W		
R37			R92-0670-05	CHIP R 0 OHM		
R38			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R39 -41			RK73FB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A473J	CHIP R 47K J 1/10W		
R46			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R47			R92-0670-05	CHIP R 0 OHM		
R49			RK73FB2A223J	CHIP R 22K J 1/10W		
R50			RK73FB2A124J	CHIP R 120K J 1/10W		
R52 -54			RK73FB2A473J	CHIP R 47K J 1/10W		
R55			RK73FB2A471J	CHIP R 470 J 1/10W		
R56			RK73FB2A104J	CHIP R 100K J 1/10W		
R57			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R58			RK73FB2A473J	CHIP R 47K J 1/10W		
R59			R92-0670-05	CHIP R 0 OHM		
R60			RK73FB2A103J	CHIP R 10K J 1/10W		
R61			RK73FB2A471J	CHIP R 470 J 1/10W		
R62			R92-0670-05	CHIP R 0 OHM		
R63 ,64			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R65 ,66			R92-0670-05	CHIP R 0 OHM		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			RK73FB2A470J	CHIP R 47 J 1/10W		
R71			R92-0670-05	CHIP R 0 OHM		
R73			RK73FB2A104J	CHIP R 100K J 1/10W		
R74			R92-0670-05	CHIP R 0 OHM		
R75			RK73FB2A103J	CHIP R 10K J 1/10W		
R76			R92-0670-05	CHIP R 0 OHM		
R78			R92-1213-05	CARBON 100 J 1/2W		
R79 ,80			RK73FB2A223J	CHIP R 22K J 1/10W		
R81			RK73FB2A471J	CHIP R 470 J 1/10W		
R82			R92-0685-05	CHIP R 22 J 1/2W		
R83			R92-0670-05	CHIP R 0 OHM		
R84 -86			R92-0670-05	CHIP R 0 OHM		
R89			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R90			RK73FB2A221J	CHIP R 220 J 1/10W		
R91			RK73FB2A473J	CHIP R 47K J 1/10W		
R92			R92-0679-05	CHIP R 0 OHM		
R93			RK73FB2A104J	CHIP R 100K J 1/10W		
R98 ,99			RK73FB2A103J	CHIP R 10K J 1/10W		
R101			RK73FB2A102J	CHIP R 1K J 1/10W		
VR1			R12-6429-05	TRIM POT. 100K		
VR2			R12-6427-05	TRIM POT. 47K		
VR3			R12-6423-05	TRIM POT. 10K		
VR4			R12-6423-05	TRIM POT. 10K		
TS1			S79-0401-05	THERMAL SWITCH(95°C)		

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144M TX-RX UNIT (X57-3580-12)
430/440M TX-RX UNIT (X57-359X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
D1			1SV164	DIODE		
D2			1SV166	DIODE		
D3 ,4			1SV164	DIODE		
D5			1SV166	DIODE		
D6			1SV164	DIODE		
D7			1SV166	DIODE		
D11			1SS184	DIODE		
D12			1SS184	DIODE		
D13			DAN235(K)	DIODE		
D14			1SS181	DIODE		
D15			MI407	DIODE		
D16			MI308	DIODE		
D17 ,18			1SS226	DIODE		
D19			DSA3A1	DIODE		
IC1			BU4094BF	IC		
IC2			LA5010M	IC(LOW SATURATION REGULATOR)		
IC5			KCD04	IC(FM IF)		
IC6			KCD05	IC(AM IF)		
IC7			KCA04	IC(MIC AMP)		
IC8			KCB11	IC(DRIVE)		
IC9			KCC04	IC(APC)		
IC10			S-AV17	IC(POWER MODULE FOR 144MHZ)		
IC11			KCH05	IC(144 PLL-VCO)		
Q1			3SK184(S)	FET		
Q2			3SK131(V12)	FET		
Q3			2SC2714(Y)	TRANSISTOR		
Q4			DTA114YK	DIGITAL TRANSISTOR		
Q5 ,6			DTC123JK	DIGITAL TRANSISTOR		
Q7			DTC143EK	DIGITAL TRANSISTOR		
Q10			2SA1362(Y)	TRANSISTOR		
Q11			2SB1119S	TRANSISTOR		
Q12			DTC144WK	DIGITAL TRANSISTOR		
Q13 ,14			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EK	DIGITAL TRANSISTOR		
Q18			2SD1757K	TRANSISTOR		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	TRANSISTOR		
Q21			2SC2712(Y)	TRANSISTOR		
Q22			FMG1	TRANSISTOR		
Q23			2SD1902R	TRANSISTOR		
Q24			2SJ106(GR)	FET		
430/440M TX-RX UNIT (X57-359X-XX) **0-12:K, P 0-22:M, M2 2-72:E**						
			A10-1316-01	CHASSIS		
			B42-2437-04	LABEL(S/NO)		
C1			CC73FCH1H030C	CHIP C 3PF C		
C2 -4			CK73FB1H102K	CHIP C 1000PF K		
C5			CC73FCH1H1R5C	CHIP C 1.5PF C		
C6			CC73FCH1H390J	CHIP C 39PF J		
C7			CK73FB1H102K	CHIP C 1000PF K		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9			CC73FCH1H030C	CHIP C 3.0PF C	KP	
C9			CC73FCH1H010C	CHIP C 1.0PF C	EMM2	
C10			CC73FCH1H390J	CHIP C 39PF J		

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430/440M TX-RX UNIT (X57-359X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C11			CK73FB1H102K	CHIP C 1000PF K		
C12			CK73FB1H102K	CHIP C 1000PF K		
C13 ,14			CK73FB1H102K	CHIP C 1000PF K		
C15			CC73FCH1H050C	CHIP C 5PF C		
C16 ,17			CK73FB1H102K	CHIP C 1000PF K		
C18			CC73FCH1H060D	CHIP C 6PF D		
C19 ,20			CK73FB1H102K	CHIP C 1000PF K		
C21			CC73FCH1H560J	CHIP C 56PF J	KP	
C21,22			CC73FCH1H330J	CHIP C 33PF J	EMM2	
C22			CC73FCH1H180J	CHIP C 18PF J	KP	
C23			CK73FB1H102K	CHIP C 1000PF K		
C24			CE04NW1C470M	ELECTRO 47UF 16WV		
C25			CK73FB1H102K	CHIP C 1000PF K		
C26			CK73FF1C105Z	CHIP C 1.0UF Z		
C27			C92-0003-05	CHIP TAN 0.47UF 25WV		
C28 ,29			CK73FF1C105Z	CHIP C 1.0UF Z		
C30			CK73FB1H102K	CHIP C 1000PF K		
C31			CK73FB1H102K	CHIP C 1000PF K		
C32			CE04NW1C470M	ELECTRO 47UF 16WV		
C33			C92-0504-05	CHIP TAN 0.68UF 20WV		
C34			CE04NW1C470M	ELECTRO 47UF 16WV		
C35			CK73FB1H102K	CHIP C 1000PF K		
C36			CE04NW1C470M	ELECTRO 47UF 16WV		
C37			CK73FB1H102K	CHIP C 1000PF K		
C38			CK73FB1H822K	CHIP C 8200PF K		
C39			CK73FB1H102K	CHIP C 1000PF K		
C40			CK73FF1C105Z	CHIP C 1.0UF Z		
C41 ,42			CC73FUJ1H180J	CHIP C 18PF J		
C43			CK73FB1H102K	CHIP C 1000PF K		
C44			CC73FCH1H060D	CHIP C 6PF D		
C45			CK73FB1H102K	CHIP C 1000PF K		
C46			CC73FCH1H150J	CHIP C 15PF J		
C47			CK73FB1H102K	CHIP C 1000PF K		
C48			CE04NW1C101M	ELECTRO 100UF 16WV		
C49			CK73FB1H102K	CHIP C 1000PF K		
C50		*	CE04NW1A330M	ELECTRO 33UF 10WV		
C51 ,52			CK73FB1H102K	CHIP C 1000PF K		
C53			CE04NW1C101M	ELECTRO 100UF 16WV		
C54 -58			CK73FB1H102K	CHIP C 1000PF K		
C60			CE04NW1C220M	ELECTRO 22UF 16WV		
C62			CK73FB1H102K	CHIP C 1000PF K		
C64 ,65			CK73FB1H102K	CHIP C 1000PF K		
C66			CM73F2H050D	CHIP C 5.0PF D	KP	
C66			CM73F2H060D	CHIP C 6.0PF D	EMM2	
C67			CC73FCH1H070D	CHIP C 7PF D		
C68			CC45SL2H150J	CERAMIC 15PF J		
C69			CC45SL2H220J	CERAMIC 22PF J		
C70			CC45SL2H220J	CERAMIC 22PF J		
C71			CC73FCH1H0R5C	CHIP C 0.5PF C		
C72			CC73FCH1H020C	CHIP C 2.0PF C		
C73			CC45SL2H080D	CERAMIC 8.0PF D		
C74			CC45SL2H100D	CERAMIC 10PF D		
C75			CC73FCH1H0R5C	CHIP C 0.5PF C		
C76			CC73FCH1H020C	CHIP C 2.0PF C		
C77			CM73F2H060D	CHIP C 6.0PF D		

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430/440M TX-RX UNIT (X57-359X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C78 -80			CK73FB1H102K	CHIP C 1000PF K		
C81			C90-2092-05	ELECTRO 1800UF 16WV		
C82 -85			CC73FSL1H101J	CHIP C 100PF J		
C86			CK73FB1H102K	CHIP C 1000PF K		
C87			CK73FB1H333K	CHIP C 0.033UF K		
C88			CE04NW1A221M	ELECTRO 220UF 10WV		
C89 -91			CK73FB1H102K	CHIP C 1000PF K		
C92			CK73FB1H471K	CHIP C 470PF K		
C93			CE04NW1C470M	ELECTRO 47UF 16WV		
C94			CC73FCH1H030C	CHIP C 3PF C		
C96			CK73FB1H102K	CHIP C 1000PF K		
C97			CK73FB1E104K	CHIP C 0.10UF K		
C98			CC73FCH1H040C	CHIP C 4PF C		
C99			CC73FCH1H020C	CHIP C 2.0PF C		
C100			CC73FCH1H070D	CHIP C 7PF D		
C102			CE04NW1C100M	ELECTRO 10UF 16WV		
C103,104			CK73FB1H102K	CHIP C 1000PF K		
C105-110			CC73FSL1H101J	CHIP C 100PF J		
C111			CK73FB1H103K	CHIP C 0.010UF K		
C112			CK73FB1H102K	CHIP C 1000PF K		
C113			CC73FCH1H020C	CHIP C 2.0PF C		
C114			CK73FB1E223K	CHIP C 0.022UF K		
C115			CK73FB1H102K	CHIP C 1000PF K		
C118			CC73FCH1H150J	CHIP C 15PF J		
TC1 ,2			C05-0346-05	TRIM CAP 6PF		
TC3			C05-0371-05	TRIM CAP 10PF		
			E22-0672-04	TERMINAL BOARD(-)		
			E22-0673-04	TERMINAL BOARD(+)		
			E30-3009-05	ANT CABLE	KPMM2	
			E30-3010-05	ANT CABLE	E	
CN1 ,2			E40-5461-05	PIN ASSY(12P)		
J1			E11-0442-05	PHONE JACK		
TP1			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
			F10-1444-03	SHIELDING PLATE		
			F10-1446-04	SHIELDING PLATE		
			F10-1477-24	SHIELDING PLATE		
			F10-2012-04	SHIELDING CASE(VCO-PLL)		
			G02-0599-04	FLAT SPRING(DB TR)		
			G02-0600-14	FLAT SPRING(THERMAL SW)		
			G02-0704-04	EARTH SPRING		
			G02-0705-04	EARTH SPRING		
			G09-0426-05	SPRING(DC CORD)		
			G11-0655-04	CUSHION(CN1,CN2)		
			G11-0656-14	CONDUCTIVE RUBBER(MCF)		
			G11-0660-04	CUSHION(VCO)		
			G11-0661-04	INSULATION SHEET(DB TR)		
			G13-0841-04	CUSHION(12.8MHZ XTAL)		
			G13-1319-04	CUSHION(VCO)		
			G13-1351-04	CUSHION(CNI,CN2)		
			G53-0508-04	CUSHION		
			J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		

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PARTS LIST

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430/440M TX-RX UNIT (X57-359X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1			L40-1872-80	SMALL FIXED INDUCTOR(18NH)		
L2			L40-1572-48	SMALL FIXED INDUCTOR(15NH)		
L3			L79-1016-05	HERICAL BLOCK		
L4			L79-1017-05	HERICAK BLOCK	EMM2	
L4			L79-1018-05	HERICAL BLOCK	KP	
L5			L40-2772-48	SMALL FIXED INDUCTOR(27NH)	KP	
L5			L40-3372-48	SMALL FIXED INDUCTOR(33NH)	EMM2	
L6			L40-2272-48	SMALL FIXED INDUCTOR(22NH)		
L7			L34-4250-05	COIL		
L8			L40-2272-48	SMALL FIXED INDUCTOR(22NH)		
L9			L34-1238-05	COIL(9.5T)		
L10			L34-1185-05	COIL(2.5T)		
L11			L34-1032-05	COIL(3.5T)		
L12			L34-1226-05	COIL(1.5T)		
L13			L34-1238-05	COIL(9.5T)		
L14			L34-1226-05	COIL(1.5T)		
L15			L40-1872-48	SMALL FIXED INDUCTOR(18NH)		
L16			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
X1			L77-1445-05	CRYSTAL RESONATOR(21.145MHZ)		
X2			L77-1405-05	CRYSTAL RESONATOR(12.8MHZ)		
XF1			L71-0411-05	MCF(21.6MHZ)		
			N09-2077-05	SCREW(MODULE)		
			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R2			RK73FB2A104J	CHIP R 100K J 1/10W		
R3			RK73FB2A333J	CHIP R 33K J 1/10W		
R4 ,5			RK73FB2A101J	CHIP R 100 J 1/10W		
R6			RK73FB2A470J	CHIP R 47 J 1/10W		
R7			RK73FB2A220J	CHIP R 22 J 1/10W		
R8			RK73FB2A471J	CHIP R 470 J 1/10W		
R10			RK73FB2A223J	CHIP R 22K J 1/10W		
R11			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R14 ,15			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R16			RK73FB2A221J	CHIP R 220 J 1/10W		
R18			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R19			RK73FB2A470J	CHIP R 47 J 1/10W		
R20			R92-0670-05	CHIP R 0 OHM		
R21			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R22			RK73FB2A334J	CHIP R 330K J 1/10W		
R24			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R25			RK73FB2A471J	CHIP R 470 J 1/10W		
R26			RK73FB2A473J	CHIP R 47K J 1/10W		
R27			RK73FB2A223J	CHIP R 22K J 1/10W		
R28			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R29 -31			RK73FB2A103J	CHIP R 10K J 1/10W		
R32			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R33 -35			RK73FB2A473J	CHIP R 47K J 1/10W		
R36			RK73FB2A154J	CHIP R 150K J 1/10W		
R37			RK73FB2A273J	CHIP R 27K J 1/10W		
R38			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R40			RK73FB2A221J	CHIP R 220 J 1/10W		
R42			R92-0670-05	CHIP R 0 OHM		
R43			RK73FB2A471J	CHIP R 470 J 1/10W		

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430/440M TX-RX UNIT (X57-359X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R44			RK73FB2A103J	CHIP R 10K J 1/10W		
R45 ,46			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R47			RK73EB2B220J	CHIP R 22 J 1/8W		
R48			R92-0670-05	CHIP R 0 OHM		
R49			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R51			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R52			RK73FB2A104J	CHIP R 100K J 1/10W		
R53			R92-0685-05	CHIP R 22 J 1/2W		
R55			R92-0670-05	CHIP R 0 OHM		
R58			R92-0679-05	CHIP R 0 OHM		
R59			R92-1214-05	CHIP R 120 J 1/2W		
R60 ,61			RK73FB2A103J	CHIP R 10K J 1/10W		
R62			RK73FB2A221J	CHIP R 220 J 1/10W		
R63			RK73FB2A473J	CHIP R 47K J 1/10W		
R64			RK73FB2A104J	CHIP R 100K J 1/10W		
R65			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R66			RK73FB2A473J	CHIP R 47K J 1/10W		
R67 ,68			RK73FB2A103J	CHIP R 10K J 1/10W		
VR1			R12-6429-05	TRIMMING POT.100K		
VR2			R12-6427-05	TRIM POT. 47K		
VR3 ,4			R12-6423-05	TRIM POT. 10K		
TS1			S59-0444-05	THERMAL SWITCH(90°C)		
D1			HSK277	DIODE		
D2			1SV128	DIODE		
D3			1SS184	DIODE		
D4			MA862	DIODE		
D5			1SS181	DIODE		
D6			1SS184	DIODE		
D7			1SS184	DIODE		
D8			MI407	DIODE		
D9			MI308	DIODE		
D10 ,11			MA716	DIODE		
D12			DSA3A1	DIODE		
D13			1SS184	DIODE		
D14			MA716	DIODE		
D15			MA862	DIODE		
IC1			KCD04	IC(FM IF)		
IC2			KCA04	IC(MIC AMP)		
IC3			BU4094BF	IC		
IC4			LA5010M	IC(LOW SATURATION REGULATOR)		
IC5			KCC04	IC(APC)		
IC6			KCB14	IC(DRIVE)		
IC7			M57788M	IC(POWER MODULE/ 430-450MHZ)		
IC8			KCB12	IC(300M FRONT)		
IC9			KCB13	IC(800M FRONT)		
IC10			KCH07	IC(VCO-PLL/430)		
Q1			3SK184(S)	FET		
Q2			2SK582	FET		
Q3			3SK184(S)	FET		
Q4			DTC114EK	DIGITAL TRANSISTOR		
Q5			2SC2714(Y)	TRANSISTOR		
Q6 ,7			FMA5	TRANSISTOR		
Q8			2SA1362(Y)	TRANSISTOR		

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430/440M TX-RX UNIT (X57-359X-XX)
1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位 置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti- nation 仕 向	Re- marks 備考
Q9			DTC144WK	DIGITAL TRANSISTOR		
Q10 ,11			2SC2712(Y)	TRANSISTOR		
Q12			2SB1119S	TRANSISTOR		
Q13 -15			DTC144EK	DIGITAL TRANSISTOR		
Q16			2SD1757K	TRANSISTOR		
Q17			2SC2712(Y)	TRANSISTOR		
Q18			2SC3123	TRANSISTOR		
Q19			FMG1	TRANSISTOR		
Q20			2SD1760(Q)	TRANSISTOR		
Q21			2SJ106(GR)	FET		
1200M TX-RX UNIT (X57-3600-11)						
			A10-1316-01	CHASSIS		
			B42-2437-04	LABEL(S/N0)		
C1			CC73FCH1H220J	CHIP C 22PF J		
C2 -5			CK73FB1H471K	CHIP C 470PF K		
C7			CC73FCH1H100D	CHIP C 10PF D		
C8			CC73FSL1H101J	CHIP C 100PF J		
C9			CC73FCH1H1R5B	CHIP C 1.5PF B		
C10 ,11			CC73FCH1H470J	CHIP C 47PF J		
C12			CK73FB1E103K	CHIP C 0.01UF K		
C13			CC73FCH1H1R5B	CHIP C 1.5PF B		
C14			CC73FSL1H101J	CHIP C 100PF J		
C15			CK73FB1H471K	CHIP C 470PF K		
C17			CC73FSL1H101J	CHIP C 100PF J		
C18			CC73FCH1H1R5B	CHIP C 1.5PF B		
C19			CE04NW1C470M	ELECTRO 47UF 16WV		
C21 ,22			CK73FB1H471K	CHIP C 470PF K		
C23			CC73FCH1H030C	CHIP C 3PF C		
C24			CC73FCH1H1R5C	CHIP C 1.5PF C		
C25			CK73FB1H102K	CHIP C 1000PF K		
C26			CK73FB1H471K	CHIP C 470PF K		
C27			CK73FB1E223K	CHIP C 0.022UF K		
C28			CC73FCH1H080D	CHIP C 8PF D		
C29			CK73FB1E103K	CHIP C 0.01UF K		
C30			CC73FCH1H030C	CHIP C 3PF C		
C31			CC73FSL1H101J	CHIP C 100PF J		
C32			CC73FCH1H030C	CHIP C 3PF C		
C33			CK73FB1H471K	CHIP C 470PF K		
C34			CK73FB1H472K	CHIP C 4700PF K		
C35			CK73FB1H102K	CHIP C 1000PF K		
C36			CC73FCH1H150J	CHIP C 15PF J		
C37			CC73FCH1H220J	CHIP C 22PF J		
C38 -41			CK73FB1E103K	CHIP C 0.01UF K		
C42			CE04NW1C470M	ELECTRO 47UF 16WV		
C43 ,44			CK73EF1C105Z	CHIP C 1.0UF Z		
C45			C92-0002-05	CHIP TAN 0.22UF 35WV		
C46			CK73FB1E104K	CHIP C 0.10UF K		
C47			CK73FB1H471K	CHIP C 470PF K		
C48			C92-0504-05	CHIP TAN 0.68UF 20WV		
C49			C92-0004-05	ELECTRO 1.0UF 16WV		
C50			CK73FB1E223K	CHIP C 0.022UF K		
C51			CK73EF1C105Z	CHIP C 1.0UF Z		
C52			CC73FCH1H030C	CHIP C 3PF C		

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TM-641A/741A/741E

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1200M TX-RX UNIT (X57-3600-11)

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C53			CK73FB1E473K	CHIP C 0.047UF K		
C54			CE04NW1C470M	ELECTRO 47UF 16WV		
C55			CK73EF1C105Z	CHIP C 1.0UF Z		
C56			CK73FB1E223K	CHIP C 0.022UF K		
C57			CK73FB1H471K	CHIP C 470PF K		
C58 ,59			CE04NW1C101M	ELECTRO 100UF 16WV		
C60			CK73FB1H471K	CHIP C 470PF K		
C61		*	CE04NW1A330M	ELECTRO 33UF 10WV		
C62 ,63			CK73FB1E103K	CHIP C 0.01UF K		
C64			CE04NW1C101M	ELECTRO 100UF 16WV		
C65			CC73GCH1H030C	CHIP C 3PF C		
C66			CC73GCH1H101J	CHIP C 100PF J		
C67 ,68			CC73GCH1H020C	CHIP C 2.0PF C		
C69			CC73GCH1H101J	CHIP C 100PF J		
C70			CC73GCH1H050C	CHIP C 5PF C		
C71			CK73EF1C105Z	CHIP C 1.0UF Z		
C72			CE04NW1E100M	ELECTRO 10UF 25WV		
C73 ,74			CK73FB1H471K	CHIP C 470PF K		
C75			CK73GB1H471K	CHIP C 470PF K		
C76			CK73FB1H471K	CHIP C 470PF K		
C77			CK73FB1E103K	CHIP C 0.01UF K		
C78 -80			CK73FB1H471K	CHIP C 470PF K		
C81			CK73EF1C105Z	CHIP C 1.0UF Z		
C82 -83			CK73FB1H471K	CHIP C 470PF K		
C84			CK73FB1H471K	CHIP C 470PF K		
C85			CE04NW1E100M	ELECTRO 10UF 25WV		
C86			CK73EF1C105Z	CHIP C 1.0UF Z		
C87 ,88			CK73GB1H471K	CHIP C 470PF K		
C89 ,90			CK73FB1H471K	CHIP C 470PF K		
C91			CE04NW1C470M	ELECTRO 47UF 16WV		
C92			CC73FCH1H470J	CHIP C 47PF J		
C93 ,94			CK73FB1H471K	CHIP C 470PF K		
C95			CC73FCH1H010C	CHIP C 1PF C		
C96			CC73FCH1H100D	CHIP C 10PF D		
C97			CK73FB1H471K	CHIP C 470PF K		
C98			CM73F2H470J	CHIP C 47PF J		
C99			CC73FSL1H101J	CHIP C 100PF J		
C100			CK73FB1E103K	CHIP C 0.01UF K		
C101			CC73FCH1H080D	CHIP C 8PF D		
C102-104			CK73FB1H471K	CHIP C 470PF K		
C105		*	CC73FCH1HR75B	CHIP C 0.75PF B		
C106			CK73FB1H471K	CHIP C 470PF K		
C107			CC73FSL1H101J	CHIP C 100PF J		
C108-110			CK73FB1H471K	CHIP C 470PF K		
C111			CC73FSL1H101J	CHIP C 100PF J		
C112			CK73FB1H471K	CHIP C 470PF K		
C113			CK73FB1H102K	CHIP C 1000PF K		
C114-116			CK73FB1H471K	CHIP C 470PF K		
C117			CK73GB1H102K	CHIP C 1000PF K		
C118			CK73FB1E103K	CHIP C 0.01UF K		
C119			CC73FSL1H101J	CHIP C 100PF J		
C120			CC73FUJ1H221J	CHIP C 220PF J		
C123-125			CK73FB1H471K	CHIP C 470PF K		
C126-130			CK73FB1H471K	CHIP C 470PF K		
C131			CK73GB1H103K	CHIP C 0.01UF K		

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1200M TX-RX UNIT (X57-3600-11)

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C132			CK73GB1H471K	CHIP C 470PF K		
C133			CK73FB1E103K	CHIP C 0.01UF K		
C134-137			CK73FB1H471K	CHIP C 470PF K		
C138			CE04NW0J470M	ELECTRO 47UF 6.3WV		
C139			CC73FSL1H101J	CHIP C 100PF J		
C140			CK73FB1E104K	CHIP C 0.10UF K		
C141,142			CK73FB1H471K	CHIP C 470PF K		
C144,145			CC73FSL1H101J	CHIP C 100PF J		
C147-156			CC73GCH1H101J	CHIP C 100PF J		
C157			CK73GB1H102K	CHIP C 1000PF K		
C158			CK73FB1H102K	CHIP C 1000PF K		
C159			CC73FSL1H101J	CHIP C 100PF J		
			E22-0672-04	TERMINAL BOARD(-)		
			E22-0673-04	TERMINAL BOARD(+)		
			E23-0467-05	TERMINAL		
			E30-3011-05	ANT. CABLE		
CN1 ,2			E40-5461-05	PIN CONNECTOR(12P)		
J1			E11-0442-05	PHONE JACK		
			F10-1444-03	SHIELDING COVER		
			F10-1445-04	SHIELDING(VCO)		
			F10-1446-04	SHIELDING(MODULE)		
			F10-1457-14	SHIELDING CASE		
			F10-1475-04	SHIELDING COVER(MODULE)		
			G02-0599-04	FLAT SPRING(IC)		
			G02-0706-04	FLAT SPRING(ANT)		
			G11-0654-04	SHEET(VCO 30X20)		
			G11-0655-04	SHEET(CN1,CN2 55X8)		
			G11-0660-04	SHEET(VCO 25X10)		
			G11-0661-04	INSULATION SHEEON		
			G13-1319-04	FORMED PLATE		
			G53-0508-04	NON-WEVERN FABRIC		
			J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0366-05	CERAMIC FILTER		
L1 ,2		*	L79-1015-05	FILTER		
L4		*	L34-4259-05	COIL		
L5			L71-0280-05	MCF		
L6			L34-2034-05	COIL(VXO)		
L7		*	L40-3982-19	SMALL FIXED INDUCTOR(0.39UH)		
L8			L40-5682-19	SMALL FIXED INDUCTOR(0.56UH)		
X1			L77-1375-05	CRYSTAL RESONATOR(59.245MHZ)		
X2			L77-1376-25	TCXO(12.8MHZ)		
			N09-2077-05	SCREW		
			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R1 ,2			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R4			RK73FB2A473J	CHIP R 47K J 1/10W		
R5			RK73GB1J473J	CHIP R 47K J 1/16W		
R6			RK73FB2A560J	CHIP R 56 J 1/10W		
R7			RK73FB2A221J	CHIP R 220 J 1/10W		
R9			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R10			RK73FB2A153J	CHIP R 15K J 1/10W		

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1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R11			RK73FB2A471J	CHIP R 470 J 1/10W		
R13			R92-0670-05	CHIP R 0 OHM		
R14			RK73GB1J180J	CHIP R 18 J 1/16W		
R15			RK73FB2A101J	CHIP R 100 J 1/10W		
R16			RK73FB2A331J	CHIP R 330 J 1/10W		
R17			RK73FB2A100J	CHIP R 10 J 1/10W		
R19			RK73FB2A151J	CHIP R 150 J 1/10W		
R20			RK73FB2A101J	CHIP R 100 J 1/10W		
R21			R92-0670-05	CHIP R 0 OHM		
R22			RK73FB2A331J	CHIP R 330 J 1/10W		
R23			RK73FB2A224J	CHIP R 220K J 1/10W		
R24			RK73FB2A561J	CHIP R 560 J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R26			RK73FB2A473J	CHIP R 47K J 1/10W		
R27			RK73FB2A471J	CHIP R 470 J 1/10W		
R29			R92-0670-05	CHIP R 0 OHM		
R30			RK73FB2A221J	CHIP R 220 J 1/10W		
R31			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R32			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R33			RK73FB2A334J	CHIP R 330K J 1/10W		
R34			RK73FB2A223J	CHIP R 22K J 1/10W		
R35			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R36 ,37			RK73FB2A103J	CHIP R 10K J 1/10W		
R38			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R39 -41			RK73FB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A474J	CHIP R 470K J 1/10W		
R43 -45			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R46			RK73FB2A684J	CHIP R 680K J 1/10W		
R47			RK73FB2A823J	CHIP R 82K J 1/10W		
R48			RK73FB2A331J	CHIP R 330 J 1/10W		
R49			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R50			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R51			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R52			RK73FB2A560J	CHIP R 56 J 1/10W		
R53			RK73GB1J271J	CHIP R 270 J 1/16W		
R54			RK73GB1J103J	CHIP R 10K J 1/16W		
R55			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R56			RK73GB1J471J	CHIP R 470 J 1/16W		
R57			RK73FB2A100J	CHIP R 10 J 1/10W		
R58			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R59			RK73FB2A683J	CHIP R 68K J 1/10W		
R60			R92-0670-05	CHIP R 0 OHM		
R61 ,62			RK73FB2A220J	CHIP R 22 J 1/10W		
R63			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R64			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R65			RK73GB1J471J	CHIP R 470 J 1/16W		
R66 ,67			RK73FB2A180J	CHIP R 18 J 1/10W		
R68			R92-0670-05	CHIP R 0 OHM		
R69			RK73FB2A333J	CHIP R 33K J 1/10W		
R70			R92-1201-05	SILID 220 1/2W		
R71			R92-0670-05	CHIP R 0 OHM		
R72		*	R92-1264-05	FIXED RESISTOR		
R73			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R74			R92-0700-05	CHIP R 180 1/2W		
R75			RK73FB2A470J	CHIP R 47 J 1/10W		

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TM-641A/741A/741E

PARTS LIST

* New Parts
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1200M TX-RX UNIT (X57-3600-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R76			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R77			R92-0670-05	CHIP R 0 OHM		
R78			RK73GB1J271J	CHIP R 270 J 1/16W		
R79 ,80			RK73FB2A103J	CHIP R 10K J 1/10W		
R81			RK73FB2A471J	CHIP R 470 J 1/10W		
R82			R92-0670-05	CHIP R 0 OHM		
R83			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
VR1			R12-6429-05	TRIMMING POT.100K		
VR2			R12-6421-05	TRIM POT. 4.7K		
VR3			R12-6427-05	TRIM POT. 47K		
VR4			R12-6423-05	TRIM POT. 10K		
VR5			R12-6427-05	TRIM POT. 47K		
D1			MA862	DIODE		
D3			MA716	DIODE		
D4			1SS193	DIODE		
D5			02CZ6.2(X,Y)	DIODE		
D6			1SS193	DIODE		
D7			1SS187	DIODE		
D8			02CZ12(X,Y)	DIODE		
D9			HSK151	DIODE		
D10 -13			MI808	DIODE		
D14			DSA3A1	DIODE		
D15			02CZ3.6(Y,Z)	DIODE		
D17			DAP202U	DIODE		
D19			MI808	DIODE		
IC2			KCD04	IC(IF)		
IC3		*	KCX03	IC(ALT)		
IC4			KCA04	IC(MIC)		
IC5			BU4094BF	IC		
IC6			LA5009M	IC		
IC7			KCB09	IC(PRE DRIVE)		
IC8			KCB10	IC(DRIVE)		
IC9			KCC04	IC(APC)		
IC10			M67711	IC(POWER MODULE/ 1.24-1.3BHZ)		
IC11			KCH03	IC(PLL)		
IC12			NJM78L05UA	IC		
IC12			RC78L05UA	IC		
Q1			MGF1502	IC		
Q2			2SC4095(R47.6)	TRANSISTOR		
Q3			3SK184(S)	FET		
Q6			2SC3356	TRANSISTOR		
Q7			2SC3120	TRANSISTOR		
Q8			2SA1362(Y)	TRANSISTOR		
Q9			2SB1302S	TRANSISTOR		
Q10			DTC144WK	DIGITAL TRANSISTOR		
Q11			FMW1	TRANSISTOR		
Q12 ,13			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EU	DIGITAL TRANSISTOR		
Q18			2SD1757(K)	TRANSISTOR		
Q19			2SA1362(Y)	TRANSISTOR		
Q20			DTC124EK	DIGITAL TRANSISTOR		
Q21 ,22			2SC4226(R23,24)	TRANSISTOR		
Q23			2SC2712(Y)	TRANSISTOR		
Q24			2SD1760(Q)	TRANSISTOR		

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1200M TX-RX UNIT (X57-3600-11)
28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
Q25			FMG1	TRANSISTOR		
Q26			2SJ106(GR)	FET		
Q28			DTC114EK	DIGITAL TRANSISTOR		
28M TX-RX UNIT (X57-3790-01)						
			A10-1325-01	CHASSIS		
			B42-2437-04	LABEL(S/NO,UNIT)		
C1			CC45SL2H181J	CERAMIC 180PF J		
C2 ,3			CC45SL2H221J	CERAMIC 220PF J		
C4			CC45SL2H271J	CERAMIC 270PF J		
C5			CC45SL2H151J	CERAMIC 150PF J		
C9			CK73GB1H103K	CHIP C 0.01UF K		
C10			CK73FB1E103K	CHIP C 0.01UF K		
C11 ,12			CK73GB1H103K	CHIP C 0.01UF K		
C13			CK73FB1E103K	CHIP C 0.01UF K		
C14 ,15			CK73GB1H103K	CHIP C 0.01UF K		
C16			CK73FB1E103K	CHIP C 0.01UF K		
C17			CC73GCH1H220J	CHIP C 22PF J		
C18			CK73GB1H103K	CHIP C 0.01UF K		
C19			CC73FCH1H030C	CHIP C 3PF C		
C20			CK73GB1H103K	CHIP C 0.01UF K		
C21 -24			CK73FB1E103K	CHIP C 0.01UF K		
C25			CC73FSL1H101J	CHIP C 100PF J		
C26			CK73FB1E103K	CHIP C 0.01UF K		
C28			CE04NW1C470M	ELECTRO 47UF 16WV		
C29			CK73GB1H103K	CHIP C 0.01UF K		
C30 ,31			CK73EF1C105Z	CHIP C 1.0UF Z		
C32			C92-0003-05	CHIP TAN 0.47UF 25WV		
C33			CK73FB1E104K	CHIP C 0.10UF K		
C34			C92-0504-05	CHIP TAN 0.68UF 20WV		
C35			CE04NW1C470M	ELECTRO 47UF 16WV		
C36			CK73FB1E103K	CHIP C 0.01UF K		
C37			CC73GCH1H330J	CHIP C 33PF J		
C38			CE04NW1C470M	ELECTRO 47UF 16WV		
C39			CK73FB1E103K	CHIP C 0.01UF K		
C40			C92-0004-05	ELECTRO 1.0UF 16WV		
C41			CK73FB1E103K	CHIP C 0.01UF K		
C42			CE04NW1E100M	ELECTRO 10UF 25WV		
C43 ,44			CK73FB1E103K	CHIP C 0.01UF K		
C45			CK73FB1E103K	CHIP C 0.01UF K		
C46			CE04NW1C470M	ELECTRO 47UF 16WV		
C47			CK73FB1E103K	CHIP C 0.01UF K		
C48			CK73FB1H822K	CHIP C 8200PF K		
C49			CK73FB1H102K	CHIP C 1000PF K		
C50			CC73FCH1H270J	CHIP C 27PF J		
C51			CC73FUJ1H100D	CHIP C 10PF D		
C52			CK73EF1C105Z	CHIP C 1.0UF Z		
C53			CK73FB1E103K	CHIP C 0.01UF K		
C54			CK73FB1H102K	CHIP C 1000PF K		
C55 -57			CK73FB1E103K	CHIP C 0.01UF K		
C58			CE04NW1E100M	ELECTRO 10UF 25WV		
C59			CE04NW1A330M	ELECTRO 33UF 10WV		
C60			CK73FB1E103K	CHIP C 0.01UF K		
C61			CE04NW1A221M	ELECTRO 220UF 10WV		

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PARTS LIST

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C62			CC73FCH1H030C	CHIP C 3PF C		
C63			CK73FB1E103K	CHIP C 18PF J		
C64			CK73FB1E103K	CHIP C 0.01UF K		
C65			CC73FCH1H180J	CHIP C 18PF J		
C66			CK73FB1E103K	CHIP C 0.01UF K		
C67			CE04NW1C101M	ELECTRO 100UF 16WV		
C68 ,69			CK73FB1E103K	CHIP C 0.01UF K		
C70			CK73FB1H223K	CHIP C 0.022UF K		
C71			CK73FB1E103K	CHIP C 0.01UF K		
C72			CK73EF1C105Z	CHIP C 1.0UF Z		
C73			CE04NW1E100M	ELECTRO 10UF 25WV		
C74			CK73FB1E103K	CHIP C 0.01UF K		
C75			CK73EF1C105Z	CHIP C 1.0UF Z		
C76			CK73FB1H223K	CHIP C 0.022UF K		
C77			CK73FB1E103K	CHIP C 0.01UF K		
C79 ,80			CK73FB1E103K	CHIP C 0.01UF K		
C81			CK73FB1H102K	CHIP C 1000PF K		
C82			CE04NW1E330M	ELECTRO 33UF 25WV		
C83			CK73FB1E103K	CHIP C 0.01UF K		
C84			CM73F2H102J	CHIP C 1000PF J		
C85			CM73F2H271J	CHIP C 270PF J		
C86			C93-0509-05			
C87			CC73FCH1H330J	CHIP C 33PF J		
C88			C93-0509-05			
C89			CK73FB1E103K	CHIP C 0.01UF K		
C90			CC73FCH1H040C	CHIP C 4PF C		
C91			CC73FCH1H0R5C	CHIP C 0.5PF C		
C92 -96			CK73FB1E103K	CHIP C 0.01UF K		
C97			CC73FCH1H080C	CHIP C 8PF C		
C98			CC73FSL1H101J	CHIP C 100PF J		
C99			CC73FCH1H820J	CHIP C 82PF J		
C100			CK73FB1E103K	CHIP C 0.01UF K		
C101			CC73FCH1H0R5C	CHIP C 0.5PF C		
C102-111			CC73FSL1H101J	CHIP C 100PF J		
C112,113			CK73FB1E103K	CHIP C 0.01UF K		
C114			CK73GB1H103K	CHIP C 0.01UF K		
C115			CK73FB1E103K	CHIP C 0.01UF K		
C116			CK73FB1E103K	CHIP C 0.01UF K		
C117			CK73FB1H102K	CHIP C 1000PF K		
C118			CE04NW1E100M	ELECTRO 10UF 25WV		
C119			CK73FB1E103K	CHIP C 0.01UF K		
C120			CC73GCH1H680J	CHIP C 68PF J		
C121			CC73GCH1H151J	CHIP C 150PF J		
C122,123			CC73GCH1H151J	CHIP C 150PF J		
C124,125			CK73FB1E103K	CHIP C 0.01UF K		
C126			CK73GB1H102K	CHIP C 1000PF K		
C127			CK73FB1E103K	CHIP C 0.01UF K		
C129			CC73FCH1H560J	CHIP C 56PF J		
C133			CC73FCH1H680J	CHIP C 68PF J		
C137			CC73FCH1H040C	CHIP C 4PF C		
C138			CC73GCH1H181J	CHIP C 180PF J		
TC1			C05-0345-05	TRIMMING CAP 10PF		
			E22-0673-04	TERMINAL BOARD(+)		
			E30-3009-05	ANT. CABLE		

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PARTS LIST

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
CN1 ,2			E40-5461-05	PIN ASSY(12P)		
J1			E11-0442-05	PHONE JACK		
TP2			E23-0465-05	TERMINAL(TP)		
			F10-2006-04	SHIELDING PLATE(FINAL)		
		*	F10-2009-04	SHIELDING PLATE(L TYPE)		
			F10-2010-03	SHIELDING COVER		
			F10-2012-04	SHIELDING CASE (VCO-PLL)		
		*	F12-0421-04	CONDUCTIVE SHEET(25.4X43)		
		*	F12-0422-04	CONDUCTIVE SHEET(25.4X15)		
			F20-1008-04	INSULATING BOARD(APC)		
		*	F20-1090-04	INSULATING BOARD(60X22)		
			G02-0600-14	FLAT SPRING(THERMAL SWITCH)		
			G02-0715-04	FLAT SPRING(APC TR)		
			G02-0718-04	FLAT SPRING(VCO)		
		*	G02-0720-04	FLAT SPRING(FRONT)		
			G11-0655-04	CONDUCTIVE RUBBER(CN1,CN1 55X8		
			G11-0661-04	INSULATING SHEET(APC TR)		
			G13-0841-04	CUSHION(XTAL)		
			G13-1319-04	CUSHION(VCO)		
			G13-1337-04	CUSHION(VCO)		
		*	J30-0583-14	SPACER(FINAL)		
			J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1		*	L34-4283-05	COIL(7.5T)		
L2 -4		*	L34-4284-05	COIL(10.5T)		
L5		*	L34-4285-05	COIL(1ST IF)		
L6			L40-6891-19	SMALL FIXED INDUCTOR(6.8UH)		
L7			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L8		*	L34-1355-05	COIL(10.5T)		
L9		*	L40-6882-19	SMALL FIXED INDUCTOR(0.68UH)		
L10			L40-3982-19	SMALL FIXED INDUCTOR(0.39UH)		
L11		*	L34-1361-05	COIL(4.5T)		
L12		*	L34-1354-05	COIL(8.5T)		
L13			L34-1352-05	COIL(8T)		
L14		*	L34-1363-05	COIL(2T)		
L15			L34-1351-05	COIL(7T)		
L16		*	L34-1364-05	COIL		
L17		*	L34-1356-05	COIL		
L18		*	L34-1355-05	COIL		
L19		*	L33-0741-05	CHOKE COIL		
L20 ,21		*	L34-1355-05	COIL(10.5T)		
L22 ,23		*	L40-5691-19	SMALL FIXED INDUCTOR(5.6UH)		
L24			L40-3982-19	SMALL FIXED INDUCTOR(0.39UH)		
L25			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L27			L40-1892-19	SMALL FIXED INDUCTOR(1.8UH)		
X1		*	L77-1465-05	CRYSTAL RESONATOR(9.285MHZ)		
XF1		*	L71-0422-05	CRYSTAL FILTER(8.83MHZ)		
			N09-2179-05	SCREW(		
			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
			N87-2608-46	BRAZIER HEAD TAPTITE SCREW		
			N88-2606-46	FLAT HEAD TAPTITE SCREW		

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R1			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R2			RK73FB2A103J	CHIP R 10K J 1/10W		
R3			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R4			RK73FB2A680J	CHIP R 68 J 1/10W		
R5			RK73FB2A271J	CHIP R 270 J 1/10W		
R6			RK73FB2A680J	CHIP R 68 J 1/10W		
R7 ,8			RK73GB1J104J	CHIP R 100K J 1/16W		
R9			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R10			RK73GB1J154J	CHIP R 150K J 1/16W		
R11			RK73GB1J470J	CHIP R 47 J 1/16W		
R12			RK73GB1J103J	CHIP R 10K J 1/16W		
R13 -15			RK73GB1J104J	CHIP R 100K J 1/16W		
R16			RK73GB1J100J	CHIP R 10 J 1/16W		
R17			RK73FB2A101J	CHIP R 100 J 1/10W		
R18			RK73FB2A473J	CHIP R 47K J 1/10W		
R19 ,20			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R21			RK73FB2A223J	CHIP R 22K J 1/10W		
R22			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R23			RK73FB2A101J	CHIP R 100 J 1/10W		
R24			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R25			RK73FB2A391J	CHIP R 390 J 1/10W		
R26			RK73FB2A563J	CHIP R 56K J 1/10W		
R27			RK73FB2A223J	CHIP R 22K J 1/10W		
R28			RK73FB2A331J	CHIP R 330 J 1/10W		
R29			RK73FB2A334J	CHIP R 330K J 1/10W		
R30			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R31			RK73FB2A274J	CHIP R 270K J 1/10W		
R32			RK73FB2A101J	CHIP R 100 J 1/10W		
R33			RK73FB2A221J	CHIP R 220 J 1/10W		
R34			RK73FB2A103J	CHIP R 10K J 1/10W		
R35			RK73FB2A104J	CHIP R 100K J 1/10W		
R36			RK73FB2A473J	CHIP R 47K J 1/10W		
R37			RK73FB2A471J	CHIP R 470 J 1/10W		
R38 ,39			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R40			RK73FB2A103J	CHIP R 10K J 1/10W		
R41			RK73FB2A474J	CHIP R 470K J 1/10W		
R42			RK73FB2A103J	CHIP R 10K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R46 -48			RK73FB2A103J	CHIP R 10K J 1/10W		
R49			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R50			RK73FB2A184J	CHIP R 180K J 1/10W		
R51			RK73FB2A223J	CHIP R 22K J 1/10W		
R52			RK73FB2A103J	CHIP R 10K J 1/10W		
R53			RK73FB2A223J	CHIP R 22K J 1/10W		
R54 ,55			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R56 -58			RK73FB2A473J	CHIP R 47K J 1/10W		
R60			RK73FB2A471J	CHIP R 470 J 1/10W		
R61			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R62			RK73FB2A104J	CHIP R 100K J 1/10W		
R63			RK73FB2A103J	CHIP R 10K J 1/10W		
R64 ,65			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R66			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		

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28M TX-RX UNIT (X57-3790-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			R92-0670-05	CHIP R 0 OHM		
R70			RK73FB2A104J	CHIP R 100K J 1/10W		
R72			RK73FB2A221J	CHIP R 220 J 1/10W		
R73			RK73FB2A220J	CHIP R 22 J 1/10W		
R74			RK73FB2A221J	CHIP R 220 J 1/10W		
R75			RK73FB2A470J	CHIP R 47 J 1/10W		
R77			R92-1213-05	SOLID 100 1/2W		
R78 ,79			RK73FB2A223J	CHIP R 22K J 1/10W		
R80			R92-0699-05	SOLID 10 1/2W		
R81			RK73FB2A103J	CHIP R 10K J 1/10W		
R82			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R83			RK73FB2A471J	CHIP R 470 J 1/10W		
R84			R92-1215-05	CHIP R 470 J 1/2W		
R85			RK73FB2A123J	CHIP R 12K J 1/10W		
R88			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R89 -92			R92-1252-05	CHIP R 0 OHM		
R93 ,94			R92-0670-05	CHIP R 0 OHM		
R95			R92-0679-05	CHIP R 0 OHM		
R96 -98			R92-0670-05	CHIP R 0 OHM		
R99			R92-1217-05	CHIP R 0		
R100-103			R92-0670-05	CHIP R 0 OHM		
R104			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R105,106			R92-0670-05	CHIP R 0 OHM		
R108			RK73FB2A681J	CHIP R 680 J 1/10W		
R111			R92-0670-05	CHIP R 0 OHM		
R115,116			R92-0670-05	CHIP R 0 OHM		
VR1			R12-6429-05	TRIMMING POT.100K		
VR2			R12-6427-05	TRIM POT. 47K		
VR3			R12-6421-05	TRIM POT. 4.7K		
VR4			R12-6423-05	TRIM POT. 10K		
TS1			S79-0401-05	THERMAL SWITCH(95°C)		
D1 ,2			MA77	DIODE		
D3 -6		*	1SV228	DIODE		
D7			DAN235(K)	DIODE		
D8			1SS184	DIODE		
D9			DAN235(K)	DIODE		
D10			1SS181	DIODE		
D11			UM9401	DIODE		
D12			MI308	DIODE		
D13 ,14			1SS226	DIODE		
D15			DSA3A1	DIODE		
D16 ,17			1SS184	DIODE		
IC1			BU4094BF	IC		
IC2		*	KCH09	IC(28MHZ VCO-PLL)		
IC3			KCA04	IC(MIC AMP)		
IC4		*	KCB16	IC(DRIVE)		
IC5			KCC04	IC(APC)		
IC6			KCD04	IC(FM IF)		
IC7			LA5009M	IC		
IC8		*	KCB17	IC(18-50MHZ FRONT)		
IC9			KCD05	IC(AM IF)		
Q1			3SK179(L)	FET		

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28M TX-RX UNIT (X57-3790-01)
28M SUB UNIT (X58-3840-01)
50M TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
Q2			3SK131(V12)	FET		
Q3			2SC2714(Y)	TRANSISTOR		
Q4 ,5			DTC144EU	DIGITAL TRANSISTOR		
Q6 ,7			DTA114EK	DIGITAL TRANSISTOR		
Q8			2SC2714(Y)	TRANSISTOR		
Q9			2SJ106(GR)	FET		
Q10			2SA1362(Y)	TRANSISTOR		
Q11			2SB1119S	TRANSISTOR		
Q12			DTC144WK	DIGITAL TRANSISTOR		
Q13			FMW1	TRANSISTOR		
Q14			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EK	DIGITAL TRANSISTOR		
Q18			2SD1757(K)	TRANSISTOR		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	TRANSISTOR		
Q21			2SC2712(Y)	TRANSISTOR		
Q22			FMG1	TRANSISTOR		
Q23			2SD1902R	TRANSISTOR		
Q24			2SC2712(Y)	TRANSISTOR		
Q25			DTA114EK	DIGITAL TRANSISTOR		
Q26			DTC143EK	DIGITAL TRANSISTOR		
Q27			DTC144EK	DIGITAL TRANSISTOR		
Z1		*	X58-3840-01	SUB UNIT(28MHZ 50W)		
28M SUB UNIT (X58-3840-01)						
C201			CC73FCH1H471J	CHIP C 470PF J		
C202,203			CK73FB1H152K	CHIP C 1500PF K		
C204			CM73F2H241J	CHIP C 240PF J		
L201			L34-1357-05	COIL(2T)		
L202			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
R201		*	R92-0686-05	CHIP R 33 J 1/2W		
Q201			2SC1971	TRANSISTOR		
Q202		*	2SC3240	TRANSISTOR		
50M TX-RX UNIT (X57-3800-01)						
			A10-1325-01	CHASSIS		
			B42-2437-04	LABEL(S/NO,UNIT))		
C1		*	CC45SL2H750J	CERAMIC 75PF J		
C2			CC45SL2H560J	CERAMIC 56PF J		
C3			CC45SL2H680J	CERAMIC 68PF J		
C4			CC45SL2H101J	CERAMIC 100PF J		
C5			CC45SL2H680J	CERAMIC 68PF J		
C6			CC45SL2H120J	CERAMIC 12PF J		
C7			CC45SL2H150J	CERAMIC 15PF J		
C8			CC45SL2H030C	CERAMIC 3.0PF C		
C9			CK73GB1H103K	CHIP C 0.01UF K		
C10			CK73FB1E103K	CHIP C 0.01UF K		
C11 ,12			CK73GB1H103K	CHIP C 0.01UF K		
C13			CK73FB1E103K	CHIP C 0.01UF K		
C14 ,15			CK73GB1H103K	CHIP C 0.01UF K		
C16			CK73FB1E103K	CHIP C 0.01UF K		
C17			CC73GCH1H120J	CHIP C 12PF J		

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50M TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C18			CK73GB1H103K	CHIP C 0.01UF K		
C19			CC73FCH1H060D	CHIP C 6PF D		
C20			CK73GB1H103K	CHIP C 0.01UF K		
C21 -24			CK73FB1E103K	CHIP C 0.01UF K		
C25			CK73FB1H102K	CHIP C 1000PF K		
C26			CK73FB1E103K	CHIP C 0.01UF K		
C27			CC73FCH1H040C	CHIP C 4.0PF C		
C28			CE04NW1C470M	ELECTRO 47UF 16WV		
C29			CK73GB1H103K	CHIP C 0.01UF K		
C30 ,31			CK73EF1C105Z	CHIP C 1.0UF Z		
C32			C92-0003-05	CHIP TAN 0.47UF 25WV		
C33			CK73FB1E104K	CHIP C 0.10UF K		
C34			C92-0504-05	CHIP TAN 0.68UF 20WV		
C35			CE04NW1C470M	ELECTRO 47UF 16WV		
C36			CK73FB1E103K	CHIP C 0.01UF K		
C37			CC73GCH1H100D	CHIP C 10PF D		
C38			CE04NW1C470M	ELECTRO 47UF 16WV		
C39			CK73FB1E103K	CHIP C 0.01UF K		
C40			C92-0004-05	ELECTRO 1.0UF 16WV		
C41			CK73FB1E103K	CHIP C 0.01UF K		
C42			CE04NW1E100M	ELECTRO 10UF 25WV		
C43 ,44			CK73FB1E103K	CHIP C 0.01UF K		
C45			CK73FB1E103K	CHIP C 0.01UF K		
C46			CE04NW1C470M	ELECTRO 47UF 16WV		
C47 -49			CK73FB1E103K	CHIP C 0.01UF K		
C50			CC73FCH1H270J	CHIP C 27PF J		
C51			CC73FCH1H120J	CHIP C 12PF J		
C52			CK73EF1C105Z	CHIP C 1.0UF Z		
C53			CK73FB1E103K	CHIP C 0.01UF K		
C54			CK73FB1H102K	CHIP C 1000PF K		
C55 -57			CK73FB1E103K	CHIP C 0.01UF K		
C58			CE04NW1E100M	ELECTRO 10UF 25WV		
C59			CE04NW1A330M	ELECTRO 33UF 10WV		
C60			CK73FB1E103K	CHIP C 0.01UF K		
C61			CE04NW1A221M	ELECTRO 220UF 10WV		
C62			CC73FCH1H100D	CHIP C 10PF D		
C63 ,64			CK73FB1E103K	CHIP C 0.01UF K		
C65			CC73FCH1H150J	CHIP C 15PF J		
C66			CK73FB1E103K	CHIP C 0.01UF K		
C67			CE04NW1C101M	ELECTRO 100UF 16WV		
C68 ,69			CK73FB1E103K	CHIP C 0.01UF K		
C70			CK73FB1E223K	CHIP C 0.022UF K		
C71			CK73FB1E103K	CHIP C 0.01UF K		
C72			CK73EF1C105Z	CHIP C 1.0UF Z		
C73			CE04NW1E100M	ELECTRO 10UF 25WV		
C74			CK73FB1E103K	CHIP C 0.01UF K		
C75			CK73EF1C105Z	CHIP C 1.0UF Z		
C76			CK73FB1E223K	CHIP C 0.022UF K		
C77			CK73FB1H681K	CHIP C 680PF K		
C78			CC73FCH1H221J	CHIP C 220PF J		
C79 ,80			CK73FB1E103K	CHIP C 0.01UF K		
C81			CK73FB1H102K	CHIP C 1000PF K		
C82			CE04NW1E330M	ELECTRO 33UF 25WV		
C83			CK73FB1E103K	CHIP C 0.01UF K		
C84			CM73F2H391J	CHIP C 390PF J		

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50M TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C85			CM73F2H820J	CHIP C 82PF J		
C86		*	C93-0509-05	CERAMIC 0.0068UF J		
C87			CC73FCH1H390J	CHIP C 39PF J		
C88		*	C93-0509-05	CERAMIC 0.0068UF J		
C89			CK73FB1E103K	CHIP C 0.01UF K		
C90			CC73FCH1H020C	CHIP C 2.0PF C		
C91			CC73FCH1H0R5C	CHIP C 0.5PF C		
C92 -96			CK73FB1E103K	CHIP C 0.01UF K		
C97			CC73FCH1H020C	CHIP C 2.0PF C		
C98 ,99			CC73FCH1H390J	CHIP C 39PF J		
C100			CK73FB1E103K	CHIP C 0.01UF K		
C101			CC73FCH1H0R5C	CHIP C 0.5PF C		
C102-111			CC73FSL1H101J	CHIP C 100PF J		
C112-113			CK73FB1E103K	CHIP C 0.01UF K		
C114			CK73GB1H103K	CHIP C 0.01UF K		
C115,116			CK73FB1E103K	CHIP C 0.01UF K		
C117			CK73FB1H102K	CHIP C 1000PF K		
C118			CE04NW1E100M	ELECTRO 10UF 25WV		
C119			CK73FB1E103K	CHIP C 0.01UF K		
C124,125			CK73FB1E103K	CHIP C 0.01UF K		
C126			CK73GB1H102K	ﾁｯﾌﾟ ｺﾝ 1000PF K		
C127			CK73FB1E103K	CHIP C 0.01UF K		
C128			CC73GCH1H270J	ﾁｯﾌﾟ ｺﾝ 27PF J		
C130,131			CC73FCH1H1R5C	CHIP C 1.5PF C		
C132			CC73FCH1H150J	CHIP C 15PF J		
C133			CC73FCH1H560J	CHIP C 56PF J		
C134			CC73GCH1H050C	CHIP C 5PF C		
C135			CC73FSL1H101J	CHIP C 100PF J		
C136			CK73FB1E104K	CHIP C 0.10UF K		
C138			CC73GCH1H151J	CHIP C 150PF J		
C139,140			CC73FCH1H470J	CHIP C 47PF J		
TC1			C05-0345-05	TRIMMING CAP.10PF		
			E22-0673-04	TERMINAL(+)		
			E30-3009-05	ANT. CABLE		
CN1 ,2			E40-5461-05	PIN ASSY(12P)		
J1			E11-0442-05	PHONE JACK		
TP2			E23-0465-05	TERMINAL(TP))		
		*	F10-2006-04	SHIELDING PLATE(FINAL)		
			F10-2009-04	SHIELDING PLATE(L TYPE)		
		*	F10-2010-03	SHIELDING COVER		
			F10-2012-04	SHIELDING CASE(VCO-PLL)		
			F20-1008-04	INSULATING SHEET(APC)		
			F20-1090-04	INSULATING SHEET(60X22)		
			G02-0600-14	FLAT SPRING(THERMAL SWITCH)		
			G02-0705-04	FLAT SPRING(BPF COIL)		
		*	G02-0715-04	FLAT SPRING(APC TR)		
			G02-0718-04	FLAT SPLING(VCO)		
			G11-0655-04	CONDUCTIVE RUBBER(CN1,CN2 55X8		
			G11-0661-04	INSULATING SHEET(APC TR)		
			G13-0841-04	CUSHION(XTAL)		
			G13-1319-04	CUSHION(VCO 22X15)		
			G13-1332-04	CUSHION		
			G13-1337-04	CUSHION(BPF COIL,VCO)		

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50M TX-RX UNIT (X57-3800-01)

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			G53-0508-04	PACKING		
		*	J30-0583-14	SPACER(FINAL)		
			J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1		*	L34-4281-05	COIL(YELLOW)		
L2 -4			L34-4283-05	COIL(WHITE)		
L5			L34-4251-05	COIL(1ST IF)		
L6			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L7			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L8		*	L34-1347-05	COIL (6.5T)		
L9			L40-4782-19	SMALL FIXED INDUCTOR(0.47UH)		
L10		*	L40-1882-19	SMALL FIXED INDUCTOR(0.18UH)		
L11		*	L34-1344-05	COIL (2.5T)		
L12			L34-1354-05	COIL (8.5T)		
L13		*	L34-1352-05	COIL (8T)		
L14		*	L34-1345-05	COIL (1T)		
L15		*	L34-1346-05	COIL (4T)		
L16			L34-1364-05	COIL (20.5T)		
L17		*	L34-1349-05	COIL (5.5T)		
L18		*	L34-1348-05	COIL (5.5T)		
L19		*	L33-0742-05	SMALL FIXED INDUCTOR(10UH)		
L20 ,21		*	L34-1347-05	COIL (6.5T)		
L25			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L26			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L27		*	L40-1592-19	SMALL FIXED INDUCTOR(0.15UH)		
L28			L40-2282-19	SMALL FIXED INDUCTOR(0.22UH)		
X1		*	L77-1464-05	CRYSTAL RESONATOR(11.05MHZ)		
XF1		*	L71-0421-05	CRYSTAL FILTER(10.595MHZ)		
		*	N09-2179-05	SCREW (X3)		
			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
			N87-2608-46	BRAZIER HEAD TAPTITE SCREW		
			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R1			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R2			RK73FB2A103J	CHIP R 10K J 1/10W		
R3			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R4			RK73FB2A680J	CHIP R 68 J 1/10W		
R5			RK73FB2A271J	CHIP R 270 J 1/10W		
R6			RK73FB2A680J	CHIP R 68 J 1/10W		
R7 ,8			RK73GB1J104J	CHIP R 100K J 1/16W		
R9			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R10			RK73GB1J154J	CHIP R 150K J 1/16W		
R11			RK73GB1J101J	CHIP R 100 J 1/16W		
R12			RK73GB1J103J	CHIP R 10K J 1/16W		
R13 -15			RK73GB1J104J	CHIP R 100K J 1/16W		
R16			RK73GB1J100J	CHIP R 10 J 1/16W		
R17			RK73FB2A101J	CHIP R 100 J 1/10W		
R18			RK73FB2A473J	CHIP R 47K J 1/10W		
R19 ,20			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R21			RK73FB2A223J	CHIP R 22K J 1/10W		
R22			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R23			RK73FB2A101J	CHIP R 100 J 1/10W		
R24			RK73FB2A152J	CHIP R 1.5K J 1/10W		

TM-641A/741A/741E

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R25			RK73FB2A391J	CHIP R 390 J 1/10W		
R26			RK73FB2A563J	CHIP R 56K J 1/10W		
R27			RK73FB2A223J	CHIP R 22K J 1/10W		
R28			RK73FB2A331J	CHIP R 330 J 1/10W		
R30			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R31			RK73FB2A274J	CHIP R 270K J 1/10W		
R32			RK73FB2A101J	CHIP R 100 J 1/10W		
R33			RK73FB2A221J	CHIP R 220 J 1/10W		
R34			RK73FB2A103J	CHIP R 10K J 1/10W		
R35			RK73FB2A334J	CHIP R 330K J 1/10W		
R36			RK73FB2A473J	CHIP R 47K J 1/10W		
R37			RK73FB2A471J	CHIP R 470 J 1/10W		
R38			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R40			RK73FB2A103J	CHIP R 10K J 1/10W		
R41			RK73FB2A474J	CHIP R 470K J 1/10W		
R42			RK73FB2A103J	CHIP R 10K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R46 -48			RK73FB2A103J	CHIP R 10K J 1/10W		
R49			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R50			RK73FB2A154J	CHIP R 150K J 1/10W		
R51			RK73FB2A223J	CHIP R 22K J 1/10W		
R52			RK73FB2A103J	CHIP R 10K J 1/10W		
R53			RK73FB2A223J	CHIP R 22K J 1/10W		
R54 ,55			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R56 -58			RK73FB2A473J	CHIP R 47K J 1/10W		
R59 ,60			RK73FB2A470J	CHIP R 47 J 1/10W		
R61			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R62			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R63			RK73FB2A183J	CHIP R 18K J 1/10W		
R64 ,65			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R66			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			R92-0670-05	CHIP R 0 OHM		
R70			RK73FB2A104J	CHIP R 100K J 1/10W		
R72			RK73FB2A471J	CHIP R 470 J 1/10W		
R73			RK73FB2A120J	CHIP R 12 2 A		
R74			RK73FB2A471J	CHIP R 471 J 1/10W		
R75			RK73FB2A470J	CHIP R 47 J 1/10W		
R76			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R77			R92-1213-05	SOLID 100 1/2W		
R78 ,79			RK73FB2A223J	CHIP R 22K J 1/10W		
R80			R92-0685-05	CHIP R 22 J 1/2W		
R81			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R82			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R83			RK73FB2A471J	CHIP R 470 J 1/10W		
R84			R92-1215-05	CHIP R 470 J 1/2W		
R86			R92-1252-05	CHIP R 0 OHM		
R88			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R90			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R93 ,94			R92-0670-05	CHIP R 0 OHM		
R95			R92-0679-05	CHIP R 0 OHM		
R96 -98			R92-0670-05	CHIP R 0 OHM		

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50M TX-RX UNIT (X57-3800-01)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
R99			R92-1217-05	CHIP R 0		
R100-103			R92-0670-05	CHIP R 0 OHM		
R104			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R105,106			R92-0670-05	CHIP R 0 OHM		
R108			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R109			RK73GB1J473J	CHIP R 47K J 1/16W		
R110			RK73FB2A221J	CHIP R 220 J 1/10W		
R111			R92-0670-05	CHIP R 0 OHM		
R112-114			R92-1252-05	CHIP R 0 OHM		
VR1			R12-6429-05	TRIM POT. 100K		
VR2			R12-6427-05	TRIM POT. 47K		
VR3			R12-6421-05	TRIM POT. 4.7K		
VR4			R12-6423-05	TRIM POT. 10K		
TS1			S59-0444-05	THERMAL SWITCH(90°C)		
D1 ,2			MA77	DIODE		
D3 -6			1SV228	DIODE		
D7			DAN235(K)	DIODE		
D8			1SS184	DIODE		
D9			DAN235(K)	DIODE		
D10			1SS181	DIODE		
D11			MI407	DIODE		
D12			MI308	DIODE		
D13 ,14			1SS226	DIODE		
D15			DSA3A1	DIODE		
D16 ,17			1SS184	DIODE		
IC1			BU4094BF	IC		
IC2		*	KCH10	IC(50MHZ VCO-PLL)		
IC3			KCA04	IC(MIC AMP)		
IC4		*	KCB18	IC(DRIVE)		
IC5			KCC04	IC(APC)		
IC6			KCD04	IC(FM IF DET)		
IC7			LA5010M	IC(10V AVR)		
IC8		*	KCB19	IC(40-76MHZ FRONT)		
IC9			KCD05	IC(AM FM)		
Q1			3SK184(S)	FET		
Q2			3SK131(V12)	FET		
Q3			2SC2714(Y)	TRANSISTOR		
Q4			DTC144EK	DIGITAL TRANSISTOR		
Q5			DTC144EU	DIGITAL TRANSISTOR		
Q6 ,7			DTA114EK	DIGITAL TRANSISTOR		
Q8			2SC2714(Y)	TRANSISTOR		
Q9			2SJ106(GR)	FET		
Q10			2SA1362(Y)	TRANSISTOR		
Q11			2SB1119S	TRANSISTOR		
Q12			DTC144WK	ﾃﾞｼﾞﾀﾙﾄﾗﾝｼﾞｽﾀ		
Q13			FMW1	ﾄﾗﾝｼﾞｽﾀ		
Q14			2SC2712(Y)	ﾄﾗﾝｼﾞｽﾀｰ		
Q15 -17			DTC144EK	ﾃﾞｼﾞﾀﾙﾄﾗﾝｼﾞｽﾀ		
Q18			2SD1757K	ﾄﾗﾝｼﾞｽﾀ		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	ﾄﾗﾝｼﾞｽﾀｰ		
Q21			2SC2712(Y)	ﾄﾗﾝｼﾞｽﾀｰ		
Q22			FMG1	ﾄﾗﾝｼﾞｽﾀ		
Q23			2SD1902R	ﾄﾗﾝｼﾞｽﾀ		

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50M TX-RX UNIT (X57-3800-01)
50M SUB UNIT (X58-3840-03)
220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
Q24			2SC2712(Y)	ﾄﾗﾝｼﾞｽﾀｰ		
Q25			DTA114EK	ﾃﾞｼﾞﾀﾙﾄﾗﾝｼﾞｽﾀ		
Q26			DTC143EK	ﾃﾞｼﾞﾀﾙﾄﾗﾝｼﾞｽﾀ		
Z1		*	X58-3840-03	SUB UNIT(50M 50W)		
50M SUB UNIT (X58-3840-03)						
C201			CC73FCH1H391J	CHIP C 390PF J		
C202			CC73FCH1H221J	CHIP C 220PF J		
C203			CK73FB1H471K	CHIP C 470PF K		
C204			CM73F2H910J	CHIP C 91PF J		
L201		*	L34-1357-05	ｸｳｼﾝｺｲﾙ (2T)		
L202			L40-1001-19	ｺｶﾞﾀｺﾃｲｲﾝﾀﾞｸﾀ (10UH)		
Q201			2SC1972	ﾄﾗﾝｼﾞｽﾀ		
Q202		*	MRF492	ﾄﾗﾝｼﾞｽﾀ		
220M TX-RX UNIT (X57-3810-10)						
			A10-1316-01	CHASSIS		
			B42-2437-04	LABEL(S/N0,UNIT)		
C5			CC73FCH1H030C	CHIP C 3PF C		
C7 -9			CK73FB1H102K	CHIP C 1000PF K		
C10			CK73FB1E103K	CHIP C 0.01UF K		
C11			CC73FCH1H0R5C	CHIP C 0.5PF C		
C12			CC73FCH1H560J	CHIP C 56PF J		
C14			CC73FCH1H0R5C	CHIP C 0.5PF C		
C15			CC73FCH1H120J	CHIP C 12PF J		
C17			CC73FCH1H120J	CHIP C 12PF J		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CC73FCH1H060D	CHIP C 6PF D		
C20			CK73FB1H102K	CHIP C 1000PF K		
C21			CC73FCH1H060D	CHIP C 6PF D		
C22			CK73FB1E103K	CHIP C 0.01UF K		
C24			CK73FB1E103K	CHIP C 0.01UF K		
C25			CC45SL2H030C	CERAMIC 3.0PF C		
C26			CK73FB1H102K	CHIP C 1000PF K		
C29			CK73FB1E103K	CHIP C 0.01UF K		
C30			CC73FCH1H150J	CHIP C 15PF J		
C31			CK73FB1H102K	CHIP C 1000PF K		
C33			CK73FB1E104K	CHIP C 0.10UF K		
C34 ,35			CK73EF1C105Z	CHIP C 1.0UF Z		
C36 ,37			CK73FB1E103K	CHIP C 0.01UF K		
C44 ,45			CE04NW1C470M	ELECTR0 47UF 16WV		
C46			C92-0504-05	CHIP TAN 0.68UF 20WV		
C47			CE04NW1C470M	ELECTR0 47UF 16WV		
C48			C92-0003-05	CHIP TAN 0.47UF 25WV		
C50			CE04NW1C470M	ELECTR0 47UF 16WV		
C51 ,52			CK73FB1E103K	CHIP C 0.01UF K		
C53 ,54			CK73FB1H102K	CHIP C 1000PF K		
C55			CK73EF1C105Z	CHIP C 1.0UF Z		
C56			CC73FUJ1H150J	CHIP C 15PF J		
C57			CK73FB1H102K	CHIP C 1000PF K		
C58			CC73FUJ1H200J	CHIP C 20PF J		
C59 ,60			CK73FB1H102K	CHIP C 1000PF K		
C61			CE04NW1C470M	ELECTR0 47UF 16WV		

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220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
C62			CK73FB1H102K	CHIP C 1000PF K		
C63			CK73FB1E103K	CHIP C 0.01UF K		
C64			CE04NW1E100M	ELECTRO 10UF 25WV		
C65			CE04NW1A330M	ELECTRO 33UF 10WV		
C66			CK73FB1E103K	CHIP C 0.01UF K		
C67			CK73FB1H102K	CHIP C 1000PF K		
C68 ,69			CC73FCH1H100D	CHIP C 10PF D		
C70			CK73FB1E103K	CHIP C 0.01UF K		
C71 -73			CK73FB1H102K	CHIP C 1000PF K		
C74			CK73FB1H223K	CHIP C 0.022UF K		
C75			CE04NW1C101M	ELECTRO 100UF 16WV		
C76			CK73EF1C105Z	CHIP C 1.0UF Z		
C77 ,78			CK73FB1H102K	CHIP C 1000PF K		
C79			CK73EF1C105Z	CHIP C 1.0UF Z		
C81			CC45SL2H180J	CERAMIC 18PF J		
C82			CK73FB1H102K	CHIP C 1000PF K		
C83			CK45B2H102K	CERAMIC 1000PF K		
C84			CC45SL2H040C	CERAMIC 4.0PF C		
C85			CC73FCH1H0R5C	CHIP C 0.5PF C		
C86			CC73FCH1H0R5C	CHIP C 0.5PF C		
C87			CC73FCH1H020C	CHIP C 2.0PF C		
C88			CC45SL2H220J	CERAMIC 22PF J		
C89			CC45SL2H180J	CERAMIC 18PF J		
C90 -92			CK73FB1H102K	CHIP C 1000PF K		
C93			CC73FCH1H0R5C	CHIP C 0.5PF C		
C94			CM73F2H050D	CHIP C 5.0PF D		
C95			CC73FCH1H020C	CHIP C 2.0PF C		
C96			CK73FB1E103K	CHIP C 0.01UF K		
C97			CC73FCH1H150J	CHIP C 15PF J		
C98			CK73FB1H102K	CHIP C 1000PF K		
C99			CE04NW1E100M	ELECTRO 10UF 25WV		
C100			CC73FCH1H010C	CHIP C 1PF C		
C101			CE04NW1E100M	ELECTRO 10UF 25WV		
C102			CC73FCH1H470J	CHIP C 47PF J		
C103			CK73FB1H102K	CHIP C 1000PF K		
C104			CK73FB1E103K	CHIP C 0.01UF K		
C105			CK73FB1H223K	CHIP C 0.022UF K		
C106			CC73FCH1H470J	CHIP C 47PF J		
C108			CC73FCH1H390J	CHIP C 39PF J		
C109,110			CK73FB1H102K	CHIP C 1000PF K		
C111			CK73FB1E103K	CHIP C 0.01UF K		
C112			CE04NW1A221M	ELECTRO 220UF 10WV		
C113			CC73FSL1H100D	CHIP C 10PF D		
C114,115			CC73FSL1H101J	CHIP C 100PF J		
C116			CC73FCH1H060D	CHIP C 6PF D		
C119			CE04NW1E100M	ELECTRO 10UF 25WV		
C120-127			CC73FSL1H101J	CHIP C 100PF J		
C128,129			CK73FB1H102K	CHIP C 1000PF K		
C130			CE04EW1C102M	ELECTRO 1000UF 16WV		
C131			CC73FCH1H070D	CHIP C 7PF D		
C133			CC73FCH1H100D	CHIP C 10PF D		
C134			CK73FB1E103K	CHIP C 0.01UF K		
C135-137			CK73FB1H102K	CHIP C 1000PF K		
C140			CC73FCH1H010C	CHIP C 1PF C		
TC1			C05-0371-05	TRIM CAP 10PF		

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220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕向	Re-marks 備考
			E22-0673-04	TERMINAL BOARD(+)		
			E30-3009-05	ANT. CABLE		
CN1 ,2			E40-5461-05	PIN ASSY		
J1			E11-0442-05	PHONE JACK		
J2			E23-0619-05	TERMINAL(TP)		
			F10-1446-04	SHIELDING PLATE		
			F10-2010-03	SHIELDING COVER		
			F10-2012-04	SHIELDING PLATE(VCO-PLL)		
			F20-1008-04	INSULATING SHEET(APC)		
			G02-0600-14	FLAT SPRING(THERMAL SWITCH)		
			G02-0705-04	FLAT SPRING		
			G02-0715-04	FLAT SPRING(APC TR)		
			G02-0718-04	FLAT SPRING(VCO)		
			G11-0655-04	SHEET(CN1,CN2 55X8)		
			G11-0656-14	CONDUCTIVE RUBBER		
			G11-0661-04	INSULATING SHEET(APC TR)		
			G13-0841-04	CUSHION(XTAL)		
			G13-1337-04	CUSHION(VCO)		
			G13-1349-04	CUSHION(VCO 22X7)		
			G13-1351-04	CUSHION(55X8)		
			J42-0471-04	DC CORD BUSHING		
CD1			L79-1013-05	FILTER		
CF1			L72-0372-05	CERAMIC FILTER(CFWM455F)		
L1 -4		*	L34-4279-05	COIL(1ST IF)		
L5			L40-1082-19	SMALL FIXED INDUCTOR(0.1UH)		
L6		*	L34-4280-05	COIL		
L10			L40-1582-19	SMALL FIXED INDUCTOR(0.15UH)		
L11			L34-1239-05	COIL		
L12			L34-1207-05	COIL		
L13			L34-1208-05	COIL		
L14			L34-0908-05	COIL		
L15 ,16			L34-0641-05	COIL		
L19			L40-8272-48	SMALL FIXED INDUCTOR(82NH)		
L20			L40-1001-19	SMALL FIXED INDUCTOR(10UH)		
L21			L40-1092-19	SMALL FIXED INDUCTOR(1UH)		
L22			L40-3372-48	SMALL FIXED INDUCTOR(33NH)		
X1			L77-1405-05	CRYSTAL RESONATOR(12.8MHZ)		
X2		*	L77-1463-05	CRYSTAL RESONATOR(30.37MHZ)		
XF1		*	L71-0420-05	CRYSTAL FILTER(30.825MHZ)		
			N09-2077-05	SCREW(MODULE)		
			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
			N88-2606-46	FLAT HEAD TAPTITE SCREW		
R5			RK73FB2A333J	CHIP R 33K J 1/10W		
R6			RK73FB2A104J	CHIP R 100K J 1/10W		
R7			RK73FB2A101J	CHIP R 100 J 1/10W		
R8			RK73FB2A103J	CHIP R 10K J 1/10W		
R9			RK73FB2A101J	CHIP R 100 J 1/10W		
R10 -12			RK73FB2A104J	CHIP R 100K J 1/10W		
R13			RK73FB2A473J	CHIP R 47K J 1/10W		
R14			RK73FB2A103J	CHIP R 10K J 1/10W		
R18			RK73FB2A151J	CHIP R 150 J 1/10W		
R19			R92-0670-05	CHIP R 0 OHM		

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R20			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R21			RK73FB2A471J	CHIP R 470 J 1/10W		
R22			RK73FB2A101J	CHIP R 100 J 1/10W		
R23			RK73FB2A103J	CHIP R 10K J 1/10W		
R24			RK73FB2A473J	CHIP R 47K J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R31			RK73FB2A394J	CHIP R 390K J 1/10W		
R32			RK73FB2A103J	CHIP R 10K J 1/10W		
R33 ,34			R92-0670-05	CHIP R 0 OHM		
R35			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R36			RK73FB2A101J	CHIP R 100 J 1/10W		
R37			R92-0670-05	CHIP R 0 OHM		
R38			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R39 -41			RK73FB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R43			RK73FB2A223J	CHIP R 22K J 1/10W		
R44			RK73FB2A273J	CHIP R 27K J 1/10W		
R45			RK73FB2A473J	CHIP R 47K J 1/10W		
R46			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R47			R92-0670-05	CHIP R 0 OHM		
R49			RK73FB2A223J	CHIP R 22K J 1/10W		
R50			RK73FB2A124J	CHIP R 120K J 1/10W		
R52 -54			RK73FB2A473J	CHIP R 47K J 1/10W		
R55			RK73FB2A471J	CHIP R 470 J 1/10W		
R56			RK73FB2A104J	CHIP R 100K J 1/10W		
R57			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R59			R92-0670-05	CHIP R 0 OHM		
R60			RK73FB2A103J	CHIP R 10K J 1/10W		
R61			RK73FB2A471J	CHIP R 470 J 1/10W		
R62			R92-0670-05	CHIP R 0 OHM		
R63 ,64			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R65 ,66			R92-0670-05	CHIP R 0 OHM		
R67			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R68			RK73FB2A220J	CHIP R 22 J 1/10W		
R69			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R71			R92-0670-05	CHIP R 0 OHM		
R73			RK73FB2A104J	CHIP R 100K J 1/10W		
R74			R92-0679-05	CHIP R 0 OHM		
R75			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R76 ,77			R92-0670-05	CHIP R 0 OHM		
R78			R92-1213-05	CARBON 100 J 1/2W		
R79 ,80			RK73FB2A223J	CHIP R 22K J 1/10W		
R81			RK73FB2A471J	CHIP R 470 J 1/10W		
R82			R92-0699-05	SOLID 10 1/2W		
R83 -86			R92-0670-05	CHIP R 0 OHM		
R89			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R90			RK73FB2A221J	CHIP R 220 J 1/10W		
R91			RK73FB2A473J	CHIP R 47K J 1/10W		
R92 ,93			RK73FB2A104J	CHIP R 100K J 1/10W		
R98			RK73FB2A223J	CHIP R 22K J 1/10W		
R99			RK73FB2A103J	CHIP R 10K J 1/10W		
R100			R92-0670-05	CHIP R 0 OHM		
R101			RK73FB2A102J	CHIP R 1K J 1/10W		
VR1			R12-6429-05	TRIMMING POT.100K		
VR2			R12-6427-05	TRIM POT. 47K		

L:Scandinavia **K**:USA **P**:Canada
Y:PX(Far East, Hawaii) **T**:England **E**:Europe
Y:AAFES(Europe) **X**:Australia **M**:Other Areas

⚠ indicates safety critical components.

PARTS LIST

⁎ New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

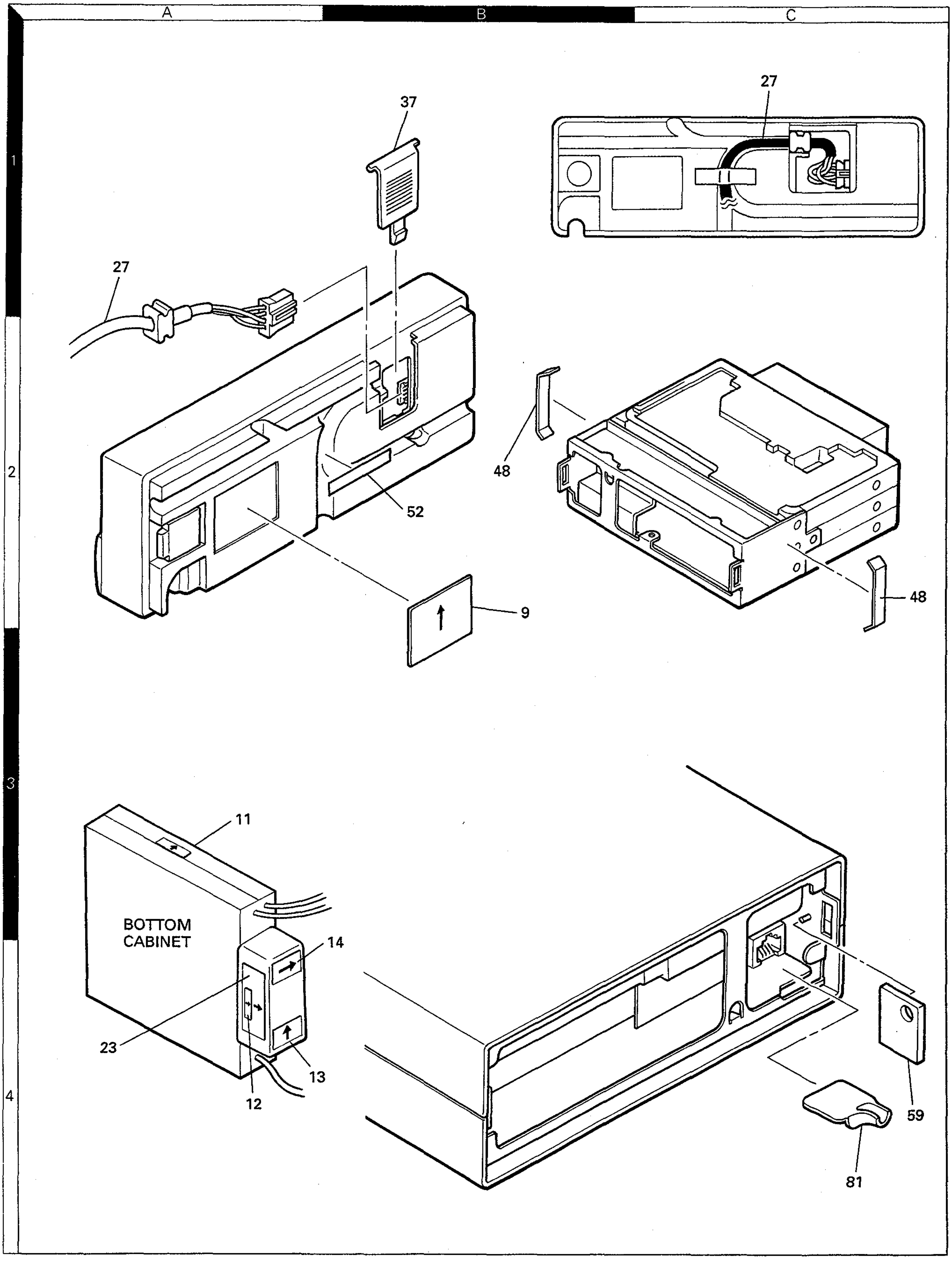
220M TX-RX UNIT (X57-3810-10)

Ref. No. 参照番号	Address 位 置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Desti-nation 仕 向	Re-marks 備考
VR3 ,4			R12-6423-05	TRIM POT. 10K		
TS1			S79-0401-05	THERMAL SWITCH(95°C)		
D3			1SV164	DIODE		
D5			1SV164	DIODE		
D7			1SV164	DIODE		
D11 ,12			1SS184	DIODE		
D13			DAN235(K)	DIODE		
D14			1SS181	DIODE		
D15			MI407	DIODE		
D16			MI308	DIODE		
D17 ,18			1SS226	DIODE		
D19			DSA3A1	DIODE		
D20			1SV164	DIODE		
IC1			BU4094BF	IC		
IC2			LA5009M	IC		
IC5			KCD04	IC(FM IF)		
IC7			KCA04	IC(MIC AMP)		
IC8		*	KCB15	IC(DRIVE)		
IC9			KCC04	IC(APC)		
IC10			M57774	IC(POWER MODULE)		
IC11		*	KCH08	IC(220PLL-VCO)		
Q1 ,2			3SK184(S)	FET		
Q3			2SC2714(Y)	TRANSISTOR		
Q10			2SA1362(Y)	TRANSISTOR		
Q11			2SB1119S	TRANSISTOR		
Q12			DTC144WK	DIGITAL TRANSISTOR		
Q13 ,14			2SC2712(Y)	TRANSISTOR		
Q15 -17			DTC144EK	DIGITAL TRANSISTOR		
Q18			2SD1757(K)	TRANSISTOR		
Q19			2SK208(Y)	FET		
Q20			2SC2714(Y)	TRANSISTOR		
Q21			2SC2712(Y)	TRANSISTOR		
Q22			FMG1	TRANSISTOR		
Q23			2SD1902R	TRANSISTOR		
Q24			2SJ106(GR)	FET		

L:Scandinavia **K:**USA **P:**Canada
Y:PX(Far East, Hawaii) **T:**England **E:**Europe
Y:AAFES(Europe) **X:**Australia **M:**Other Areas

⚠ indicates safety critical components.

EXPLODED VIEW


A
B
C
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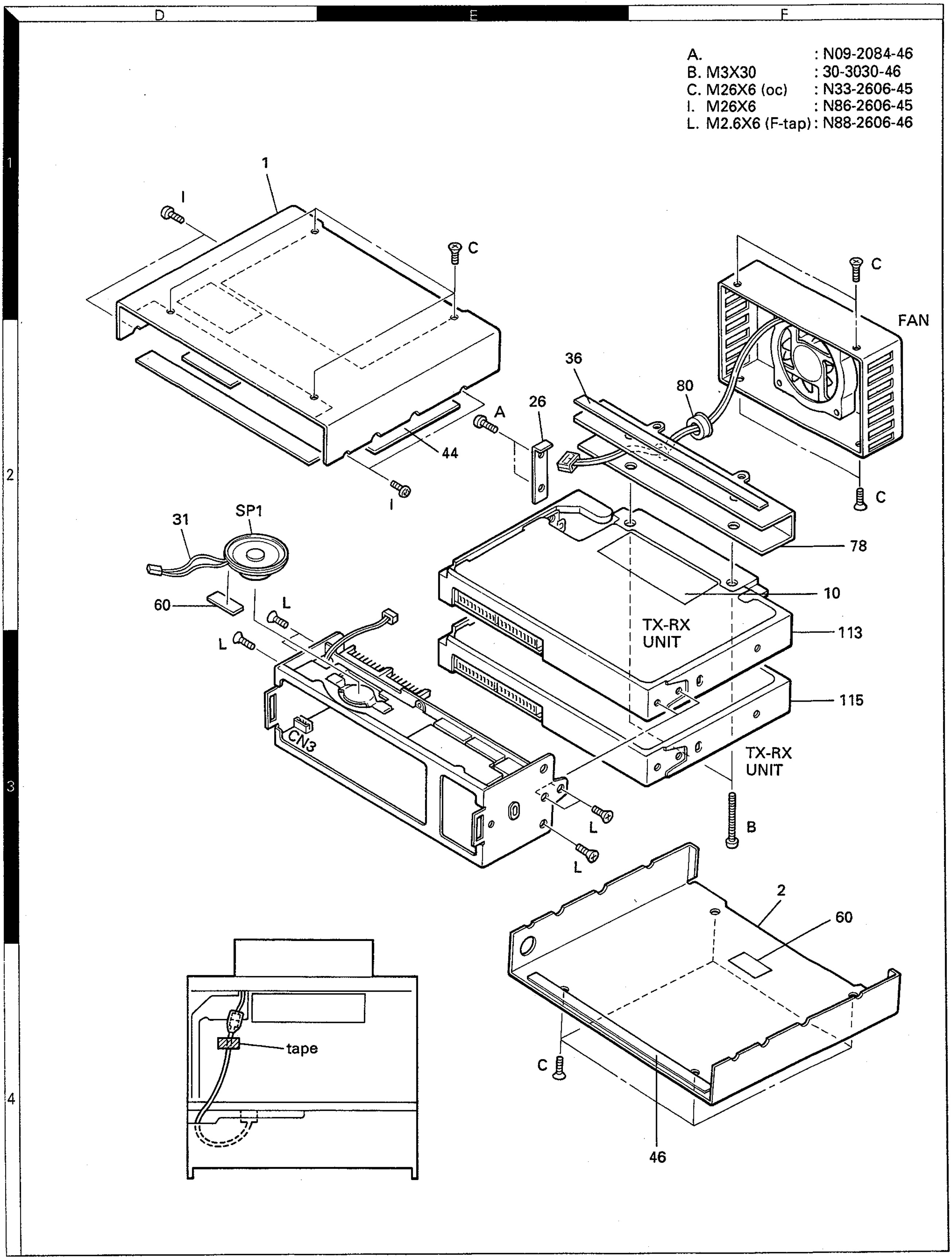
4
37
27
27
48
52
9
48
11
BOTTOM CABINET
14
23
13
12
59
81

TM-641A/741A/741E

EXPLODED VIEW

A. : N09-2084-46
B. M3X30 : 30-3030-46
C. M26X6 (oc) : N33-2606-45
I. M26X6 : N86-2606-45
L. M2.6X6 (F-tap) : N88-2606-46


D
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F
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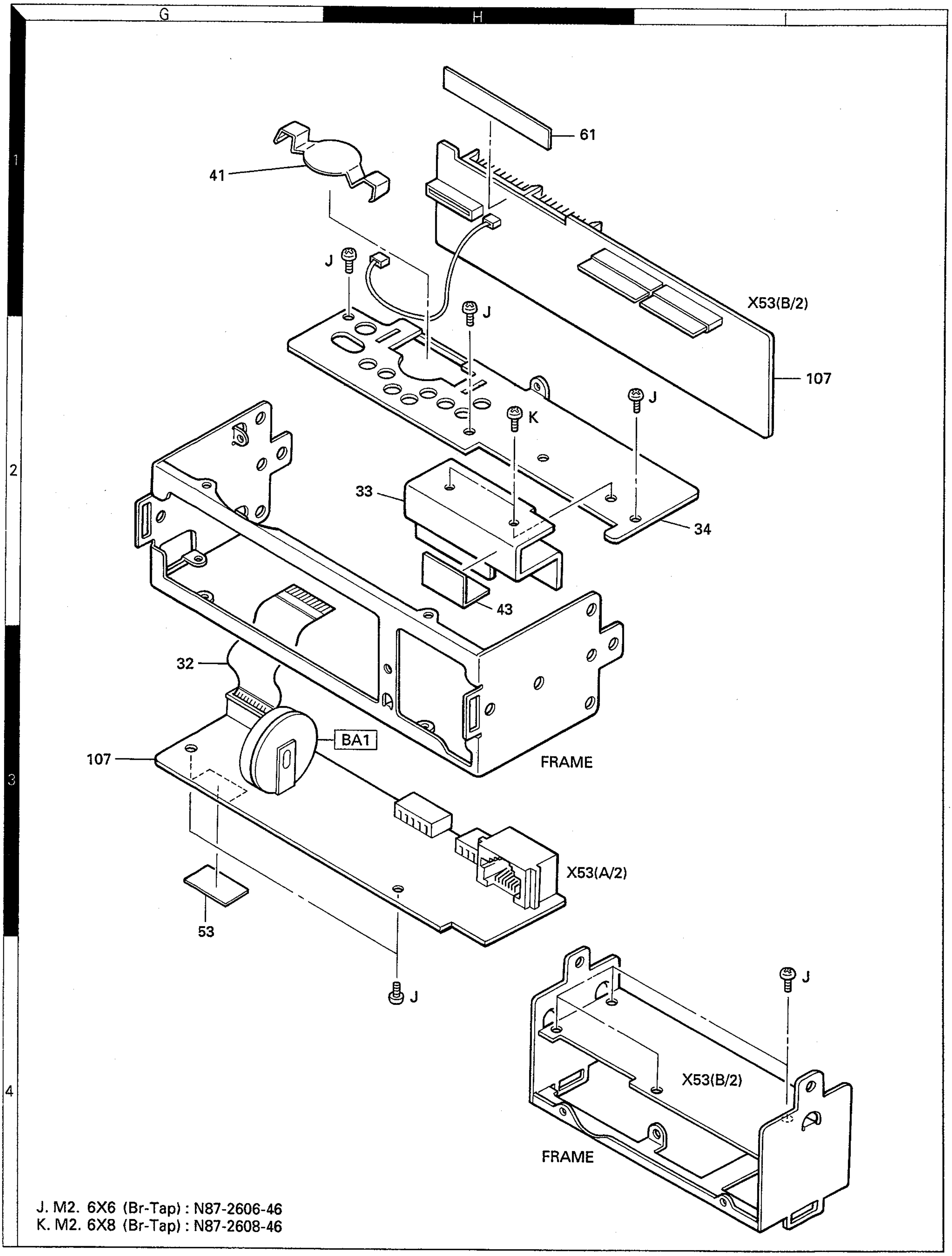
I
C
C
FAN
36
80
26
A
44
I
C
31
SP1
78
10
60
L
L
TX-RX
UNIT
113
115
TX-RX
UNIT
CN3
L
L
B
2
60
tape
C
46

EXPLODED VIEW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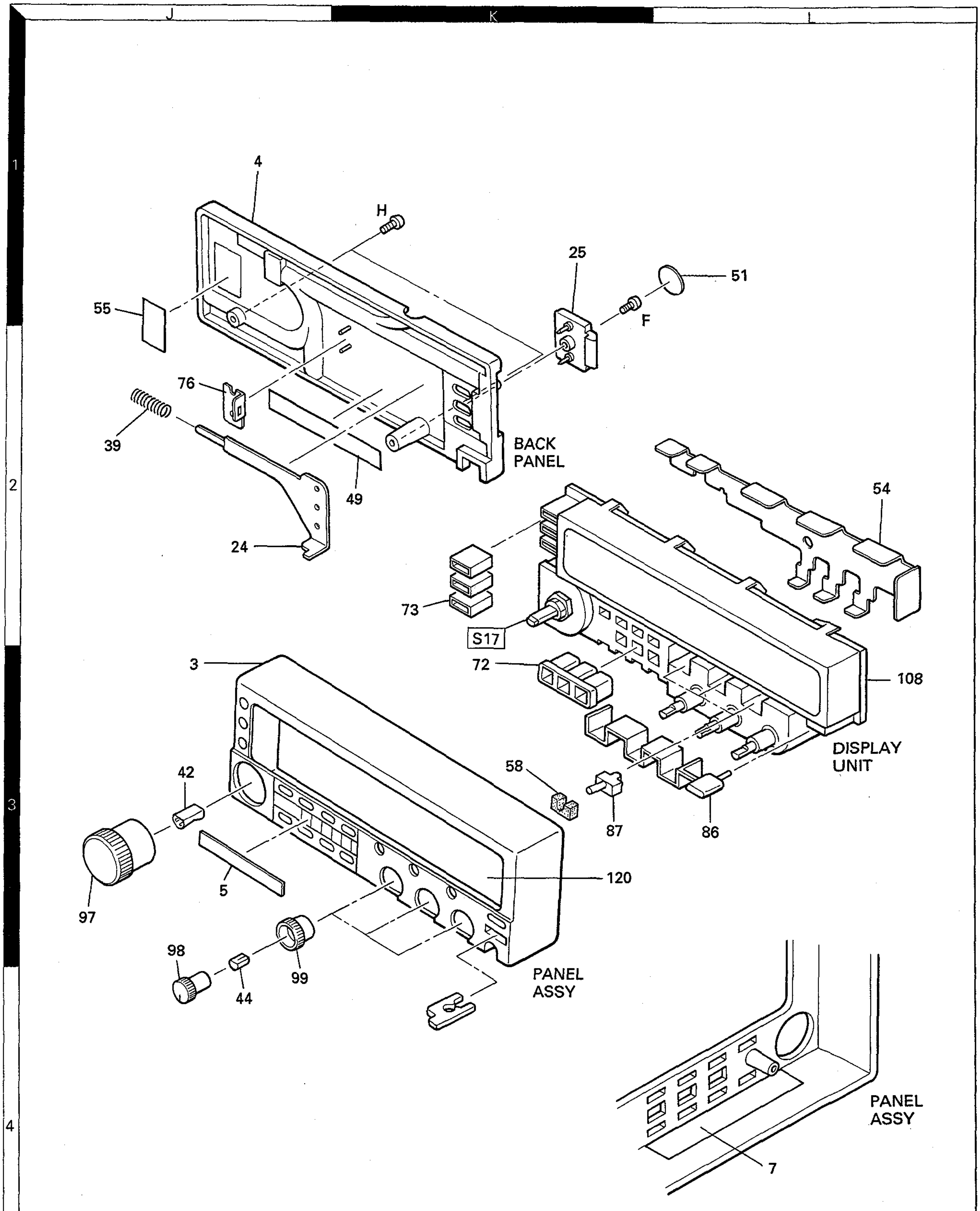
H
1
2
3
4
61
41
J
J
X53(B/2)
107
J
K
33
34
43
32
BA1
107
FRAME
X53(A/2)
53
J
J
X53(B/2)
FRAME

J. M2. 6X6 (Br-Tap) : N87-2606-46
K. M2. 6X8 (Br-Tap) : N87-2608-46

EXPLODED VIEW


J
K
L
1
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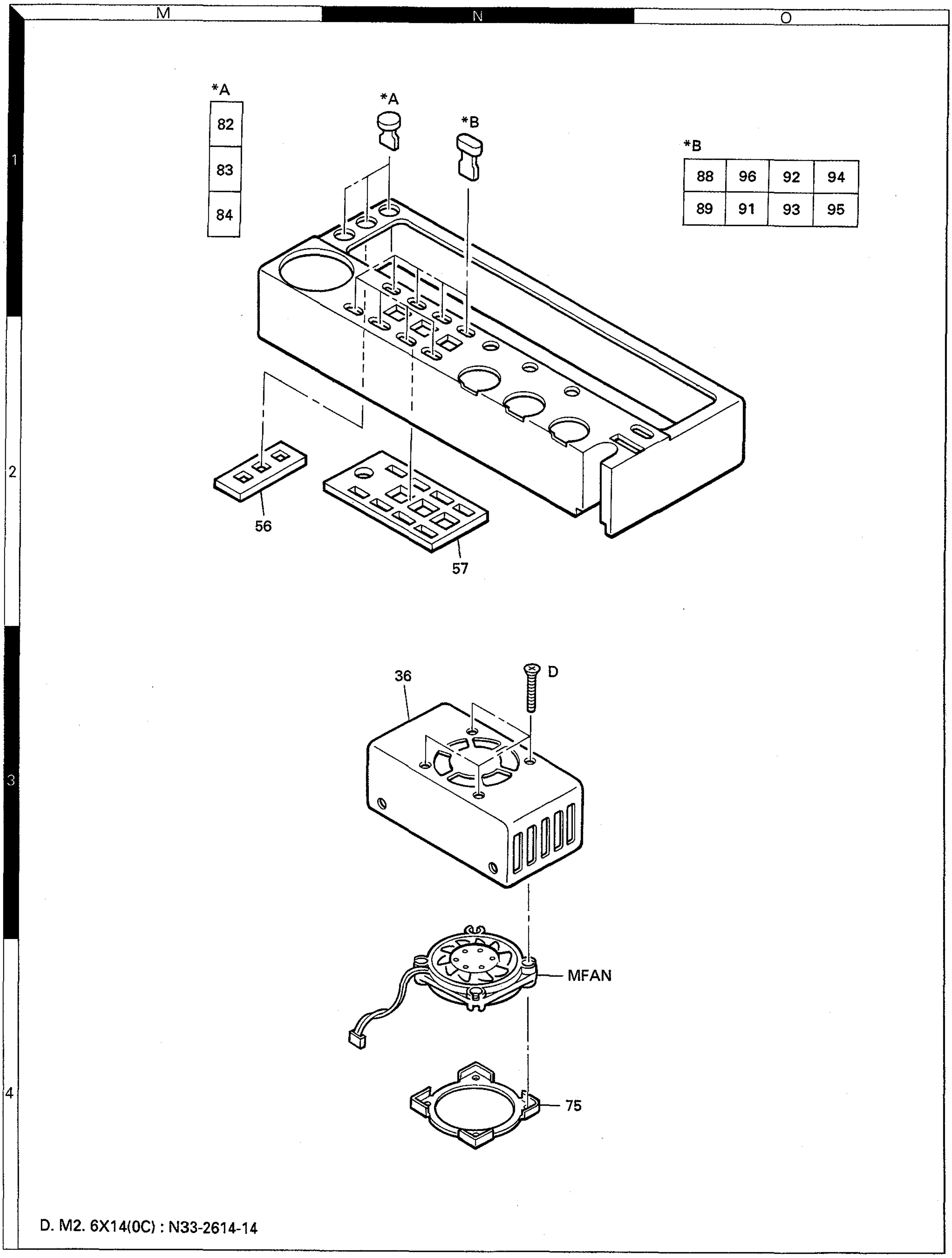
3
4
4
H
25
51
55
F
76
39
BACK
PANEL
49
54
24
73
S17
3
72
108
DISPLAY
UNIT
42
58
87
86
120
97
5
98
99
44
PANEL
ASSY
PANEL
ASSY
7

F. M2 :N38-2050-45
H. M2X6 :N80-2006-45

EXPLODED VIEW


M
N
O
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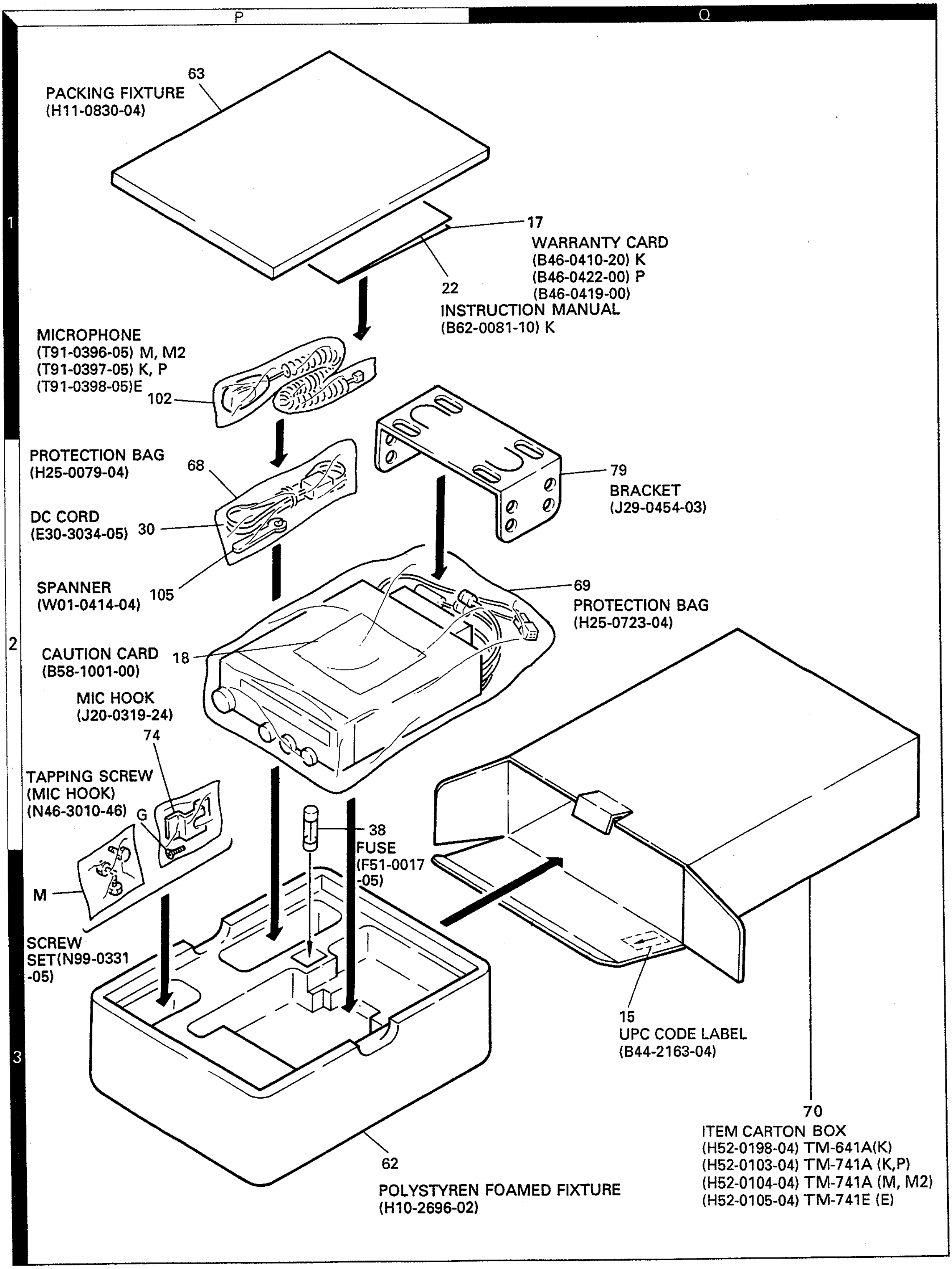
*A
82
83
84
*A
*B
*B
88
96
92
94
89
91
93
95
56
57
36
D
MFAN
75

D. M2. 6X14(0C) : N33-2614-14

TM-641A/741A/741E

PACKING (MAIN UNIT)


P
Q
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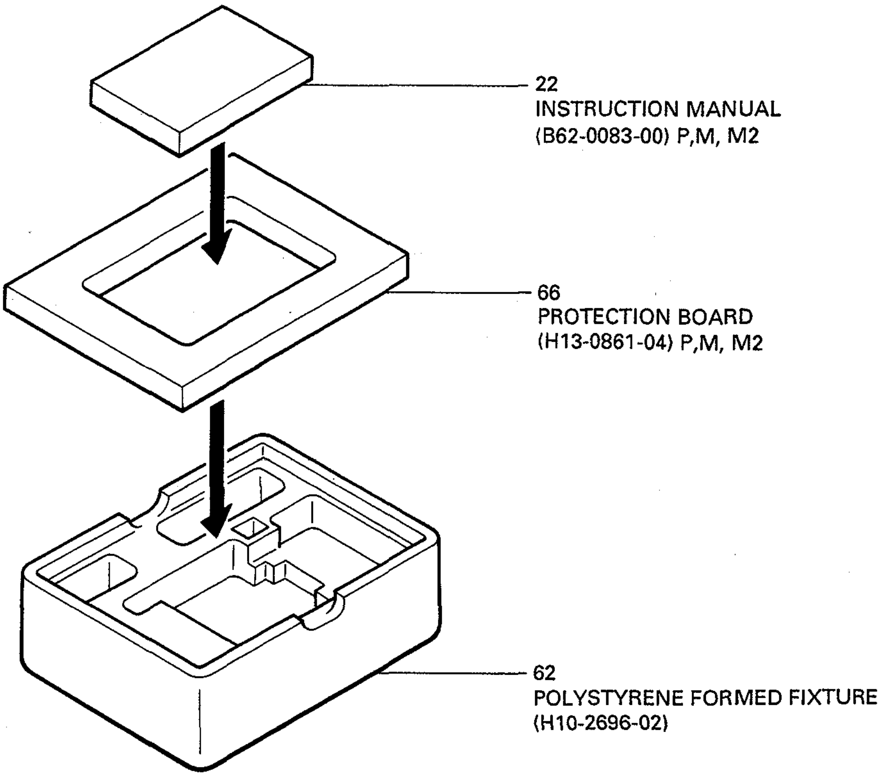
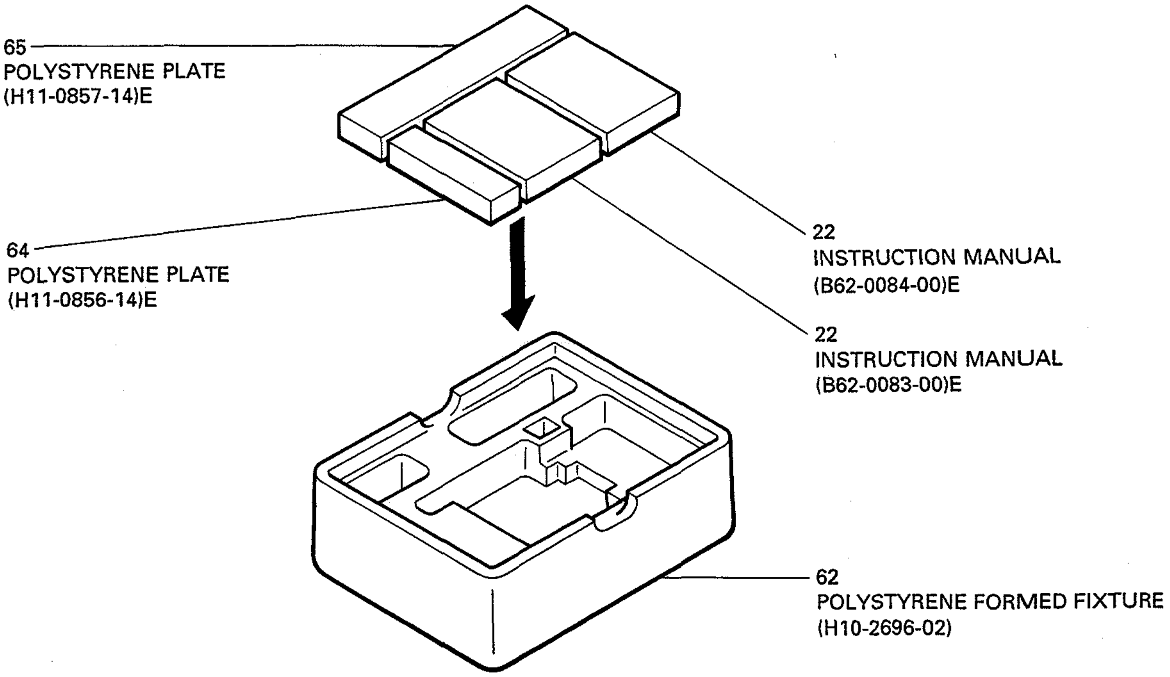
2
3
63
PACKING FIXTURE
(H11-0830-04)
17
WARRANTY CARD
(B46-0410-20) K
(B46-0422-00) P
(B46-0419-00)
22
INSTRUCTION MANUAL
(B62-0081-10) K
MICROPHONE
(T91-0396-05) M, M2
(T91-0397-05) K, P
(T91-0398-05)E
102
PROTECTION BAG
(H25-0079-04)
68
DC CORD
(E30-3034-05) 30
79
BRACKET
(J29-0454-03)
SPANNER
(W01-0414-04)
105
69
PROTECTION BAG
(H25-0723-04)
CAUTION CARD
(B58-1001-00)
18
MIC HOOK
(J20-0319-24)
74
TAPPING SCREW
(MIC HOOK)
(N46-3010-46)
G
38
FUSE
(F51-0017
-05)
M
SCREW
SET(N99-0331
-05)
15
UPC CODE LABEL
(B44-2163-04)
70
ITEM CARTON BOX
(H52-0198-04) TM-641A(K)
(H52-0103-04) TM-741A (K,P)
(H52-0104-04) TM-741A (M, M2)
(H52-0105-04) TM-741E (E)
62
POLYSTYREN FOAMED FIXTURE
(H10-2696-02)

PACKING (MAIN UNIT)

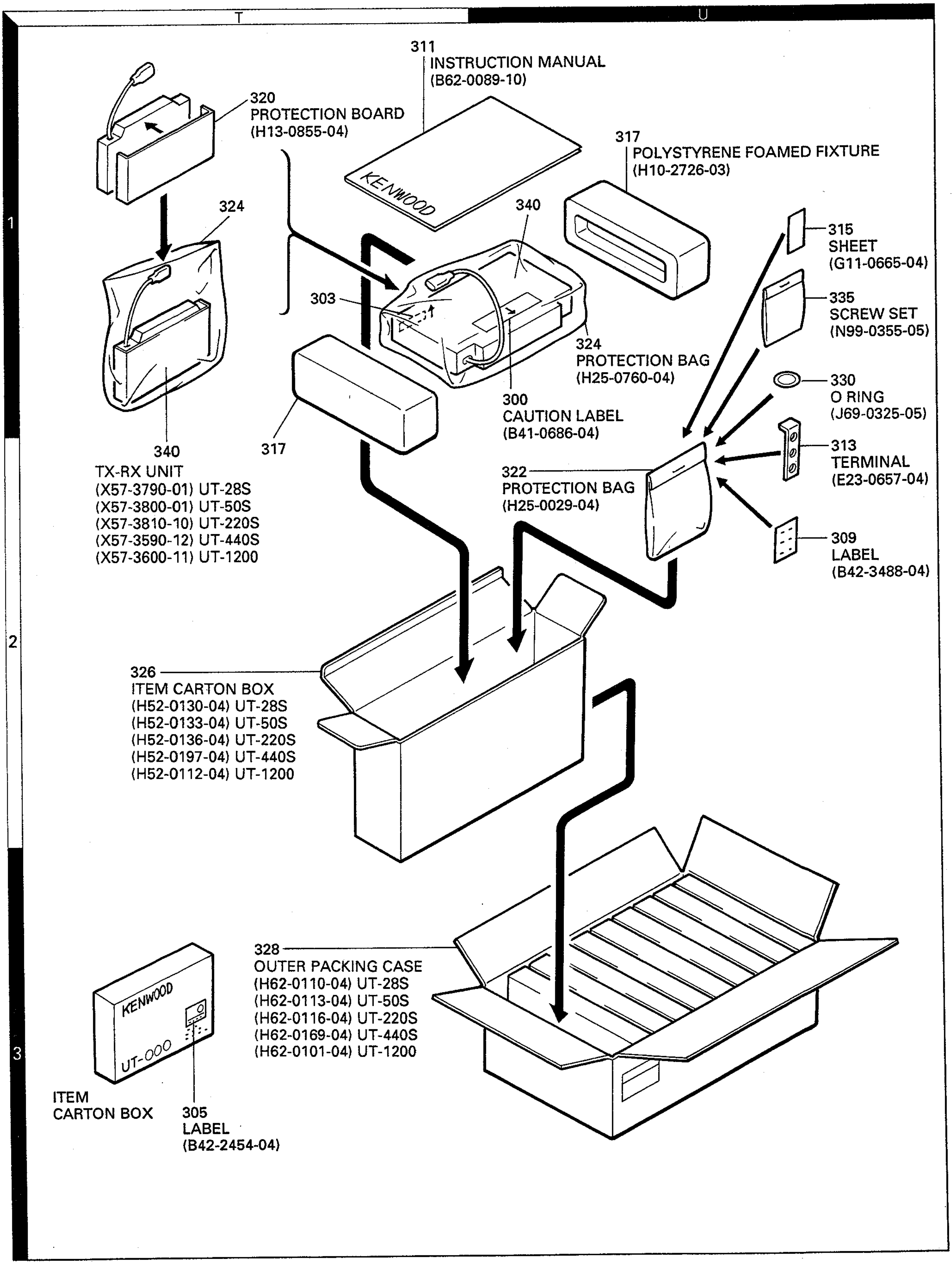
TM-741A


22
INSTRUCTION MANUAL
(B62-0083-00) P,M, M2
66
PROTECTION BOARD
(H13-0861-04) P,M, M2
62
POLYSTYRENE FORMED FIXTURE
(H10-2696-02)

TM-741E


65
POLYSTYRENE PLATE
(H11-0857-14)E
64
POLYSTYRENE PLATE
(H11-0856-14)E
22
INSTRUCTION MANUAL
(B62-0084-00)E
22
INSTRUCTION MANUAL
(B62-0083-00)E
62
POLYSTYRENE FORMED FIXTURE
(H10-2696-02)

PACKING (OPTIONAL BAND UNIT)


T
U
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3
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INSTRUCTION MANUAL
(B62-0089-10)
320
PROTECTION BOARD
(H13-0855-04)
317
POLYSTYRENE FOAMED FIXTURE
(H10-2726-03)
KENWOOD
324
340
315
SHEET
(G11-0665-04)
303
335
SCREW SET
(N99-0355-05)
324
PROTECTION BAG
(H25-0760-04)
330
O RING
(J69-0325-05)
300
CAUTION LABEL
(B41-0686-04)
340
317
TX-RX UNIT
(X57-3790-01) UT-28S
(X57-3800-01) UT-50S
(X57-3810-10) UT-220S
(X57-3590-12) UT-440S
(X57-3600-11) UT-1200
313
TERMINAL
(E23-0657-04)
322
PROTECTION BAG
(H25-0029-04)
309
LABEL
(B42-3488-04)
326
ITEM CARTON BOX
(H52-0130-04) UT-28S
(H52-0133-04) UT-50S
(H52-0136-04) UT-220S
(H52-0197-04) UT-440S
(H52-0112-04) UT-1200
328
OUTER PACKING CASE
(H62-0110-04) UT-28S
(H62-0113-04) UT-50S
(H62-0116-04) UT-220S
(H62-0169-04) UT-440S
(H62-0101-04) UT-1200
KENWOOD
UT-000
ITEM
CARTON BOX
305
LABEL
(B42-2454-04)

ADJUSTMENT

Required Test Equipment

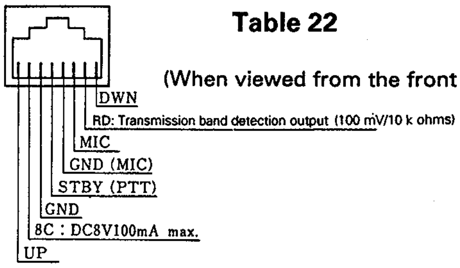
1. Tester and DC V.M
   Use a tester with high input impedance.
2. RF VTVM (RF VM)
   Input impedance: 1 M ohms or more, 2 pF or less
   Voltage range: FS = 10 mV to 300 V
   Measurable frequency: 1,300 MHz (maximum)
3. Frequency counter (F counter)
   Input sensitivity: Approximately 50 mV
   Measurable frequency: 1,300 MHz or more
4. DC power supply
   Voltage: 10 to 17 V (variable)
   Current: 12 A or more
5. Power meter
   Power measurement ranges: 100 W, 50 W, and 15 W
   Input impedance: 50 ohms
   Measurable frequency: 1,300 HMz
6. AF vacuum voltmeter (AF VM)
   Input impedance: 1 M ohms or more
   Voltage range: FS= 1 mV to 30 V
   Measurable frequency: 50 Hz to 10 kHz
7. AF generator (AG)
   Output frequency: 100 Hz to 10 kHz
   Output voltage: 0.5 mV to 1 V
8. Linear detector
   Measurable frequency: 1,300 MHz
9. Spectrum analyzer
   Measurable frequency: 1,300 MHz
10. Directional coupler
11. Oscilloscope
    Use a high-sensitivity oscilloscope with horizontal input socket.
12. SSG
    Use an SSG that produces a frequency of 20 to 1,300 MHz with amplitude and frequency modulation.
    Output level: 0.1µV to 100 mV
13. Dummy resistor
    Use an 8-ohm resistor exceeding the rated value in each band.
14. Noise generator
    Use a noise generator whose output contains a high-frequency component of more than 1,300 MHz (near ignition noise).
15. Sweep generator
    Use a sweep generator that can sweep the 1,300 MHz band.
16. Tracking generator

Preparation

- Set controls to the position shown in Table 22 unless otherwise specified.

POWER SW	ON	CALL SW	OFF
AF VOL VR	MIN	SHIFT, AGC	OFF
SQL VOL VR	MN	TONE, SHIFT	OFF
MR/M	OFF	REV, STEP	OFF
VFO, MR/M	VFO	DTSS	OFF

Table 22



(When viewed from the front of the set)

Fig. 43 Microphone Socket (on Front Panel)

- Use an insulated tool such as a plastic tool during adjustment (especially trimmer coil adjustment).
- For SSG protection, do not connect a microphone to the microphone socket during receiver block adjustment.
- check that the power switch is off before the power cord is connected.
- The SSG output level is displayed at the release end.
- Check that the display and LCD display are shown in Figure 44 after controls are set as in shown in Table 22.

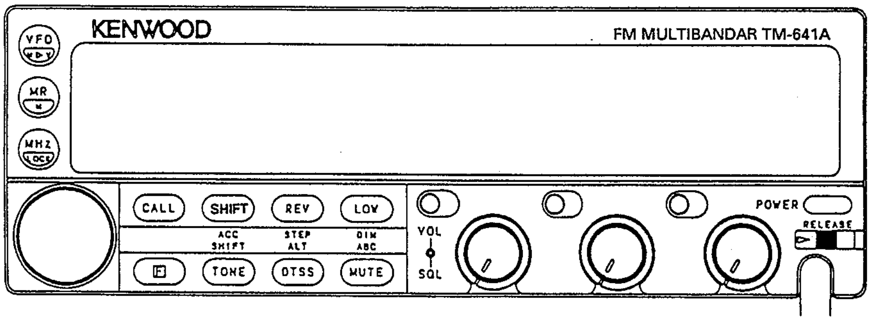


Fig. 44

ADJUSTMENT

- **144 MHz Band (TM-641A, 741A/E)**

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 144.040MHz Receive	Digital voltmeter	TX-RX	TP2			Check the lock voltage.	1.8 ~ 3.0 V

The DC power supply must be set to the rated voltage.

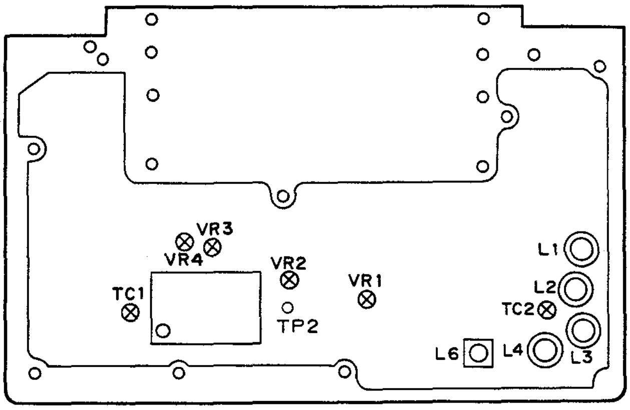
Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Bandpass filter (BPF) adjustment	1. Frequency: 144.040MHz SSG output: 0 dBμ Modulation: 1 KHz Deviation: 3 KHz Receive	Digital voltmeter SSG			TX-RX	L1-4	Adjust so that the voltmeter reading is maximum.	Voltmeter reading is maximum.
2. Receive sensitivity	1. Frequency: 144.040 MHz 145.940 MHz 147.940 MHz SSG output: -9 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAD or more
	2. AM sensitivity (K and P models only) Fequency: 118.040 MHz SSG output: 25 dBμ Modulation:1 KHz Deviation: 30%						Press the MHz key and check that the frequency is set to 118.040 with an encoder.	12 dB SINAD or more
	Press the MR key							
3. Distortion factor	1. Frequency: 145.940 MHz SSG output: 40 dBμ Modulation: 1 KHz Deviation: 3 KHz AF output: 4V/8 ohms	Distortion factor Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L6	Minimize the distortion factor.	5% or less
4. Signal strength meter adjustment	1. Frequency: 145.940 MHz SSG output: 22dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1	Adjust so that all LEDs go on, then one LED goes off.	
	2 SSG output: 23 dBμ						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ
5. Squelch check	1. Frequency: 145.940 MHz SSG output: Off Modulation: 1 KHz Deviation: 3 KHz	SSG	Rear panel	EXT.SP			1. Set the SQL knob to the closed position when the SSG output is off.	The SQL knob position is between 8 o'clock and 11 o'clock. The BUSY LED goes off.
	2 SSG output: -14dBμ							The squelch is open. the BUSY LED goes on.

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Power adjustment	1. Maximum power check Frequency: 136.000 MHz 145.980 MHz 147.980 MHz Transmit	Powermeter Ammeter	Rear Panel	ANT	TX-RX	VR3	Check	57 W or more
	2. High-power adjustment Transmit				TX-RX	VR3	Adjust. 54W	46 to 59 W (11.5 A or less)
	3. Medium-power adjustment Transmit				TX-RX	VR4	Adjust. 12W	10 to 14 W
	4. Low-power check Transmit						Check	3 to 8 W
2. Deviation adjustment	1. Frequency: 145.980 MHz AG: 1 KHz, 50 mV (K,P, M,M2) 25 mV (E) Filter: 25 15K Transmit	DC detector Oscilloscope	Rear Panel	ANT	TX-RX	VR2	Adjust (in the higher + or – direction). 4.2 KHz	± 4.0 to 5.0 KHz
	2. Frequency: 145.980 MHz AG: 1 KHz, 5.0 mV (K,P, M,M2) 2.5 mV (E) Transmit						Check	± 2.2 to 3.6 KHz
3. Tone check	1. Frequency: 145.220 MHz Tone: On Transmit	DC detector Oscilloscope	Rear Panel	ANT			Check	± 0.5 to 1.5 KHz
4. Protection check	1. Frequency: 147.980 MHz Antenna: Open Transmit	Ammeter					Check	12.0 A or less
5. Frequency check	1. Frequency: 145.980 MHz Transmit	Frequency counter Powermeter			TX-RX	TC1	145.980 MHz	± 100 Hz



Note: Use an adjustment tool with a ceramic or plastic tip 1.5 mm square for L1 through L4.

Fig. 45 144 MHz band adjustment: Component layout (upper view)

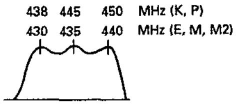
ADJUSTMENT

- **430/440 MHz Band (TM-740A/E, UT-440S)**

Common Section adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 468.000 MHz Receive	Digital voltmeter	TX-RX	TP2			Check the lock voltage.	7.5 ~ 9.1 V (K, P) 7.0 ~ 9.5 V (E, M, M2)

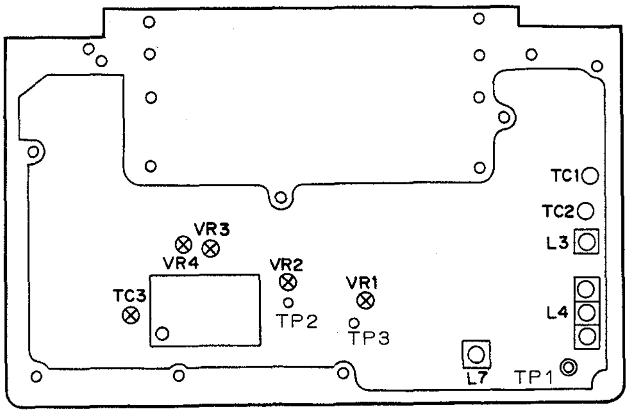
Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Helical scanning adjustment	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M, M2) Spectrum analyzer: Center of above frequency Tracking generator: Output: -30 dBm	Digital voltmeter Spectrum analyzer Tracking generator			TX-RX	TC1, TC2, L3, L4X3	 Adjust each frequency as shown in the figure.	
2. Receive sensitivity	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M, M2) SSG output: -9 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAD or more
3. Distortion factor	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M, M2) SSG output: 40 dBμ Modulation: 1 KHz Deviation: 3 KHz AF output: 4 V/8 ohms	Distorition meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L7	Minimize the distortion factor.	5% or less
4. Signal strength meter adjustment (check)	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M, M2) SSG output: 23 dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1		Adjust so that all LEDs go on, then one LED goes off.
	2. SSG output: 24 dBμ						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ.
5. Squelch check	1. Frequency: 445.050 MHz (K and P) 435.050 MHz (E, M, M2) SSG output: Off Modulation: 1 KHz Deviation: 3 KHz	SSG	Rear panel	EXT.SP			1. Set the SQL knob to the closed position when the SSG output is off.	The knob position is between 8 o'clock and 11 o'clock. The BUSY LED goes off.
	2. SSG output: -14 dBμ							The squelch is open. The BUSY LED goes on.

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Power adjustment	1. Maximum power check Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M, M2) Transmit	Powermeter Ammeter	Rear panel	ANT	TX-RX	VR3	Check	38 W or more
	2. High power adjustment Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M, M2) Transmit				TX-RX	VR3	Adjust. 37W	31 to 42 W (10 A or less)
	3. Medium power adjustment Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M, M2) Transmit				TX-RX	VR4	Adjust. 13W	10 to 14 W
	4. Low power check Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M, M2) Transmit						Check	3 to 8 W
2. Deviation adjustment	1. Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M, M2) AG: 1 KHz, 50 mV (K, P, M, M2) 25 mV (E), Filter: 25 15K Transmit	DC detector Oscilloscope	Rear panel	ANT	TX-RX	VR2	Adjust (in the higher + or – direction). 4.2 KHz	± 4.0 to 5.0 KHz
	2. Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M, M2) AG: 1 KHz, 5.0 mV (K, P, M, M2) 2.5 mV (E) Transmit						Check	± 2.2 to 3.6 KHz
3. Tone check	1. Frequency: 438.200 MHZ (E, M, M2) 448.200 MHz (K, P) Tone: On Transmit	DC detector Oscilloscope	Rear panel	ANT			Check	± 0.5 to 1.5 KHz
4. Protection check	1. Frequency: 449.980 MHz (K and P) 439.980 MHz (E, M, M2) Antenna: Open Transmit	Ammeter					Check	10 A or less
5. Frequecy check	1. Frequency: 445.000 MHz (K and P) 435.000 MHz (E, M, M2) Transmit	Frequency counter Powermeter			TX-RX	TC3	445.000 MHz K,P 435.000 MHz E, M, M2	± 500 Hz



To adjust the 430 MHz band, remove the 144 MHz band unit from the control unit.

Fig. 46 430 MHz band adjustment: Component layout (upper view)

ADJUSTMENT

● 1200 MHz Band (UT-1200)

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 1299.975 MHz Receive	Digital voltmeter	TX-RX	TP2	TX-RX IC11	TRIM-CAP.	Check the lock voltage.	6.1 ~ 6.9 V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. ALT adjustment	1. Frequency: 1270.100 MHz	Digital voltmeter SSG					Check the voltage.	AV
	2. The same as the above frequency. SSG: Off				TX-RX	VR2	Adjust so that the voltage is 0.1 V higher than above.	AV + 0.1 V
	3. The same as the above frequency. SSG output: 0 dBμ Modulation: 1 KHz Deviation: 3 KHz				TX-RX	L6	Check that the voltage is 0.2 V higher than above when ALT is on, then turn ALT off.	(A + 0.1) V + 0.2 V
2. Receive sensitivity	1. Frequency: 1270.100 MHz SSG output: -8.5 dBμ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAD or more
3. Distortion adjustment	1. Frequency: 1270.100 MHz SSG output: 40 dBμ Modulation: 1 KHz Deviation: 3 KHz AF output: 4 V/8 ohms	Distortion meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L4	Minimize the distortion factor.	5% or less
4. Signal strength meter adjustment (check)	1. Frequency: 1270.100 MHz SSG output: 24 dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1		Adjust so that all LEDs go on, then one LED goes off.
	2. SSG output: 25 dBμ						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ.
5. Squelch check	1. Frequency: 1270.100 MHz SSG output: Off Modulation: 1 KHz Deviation: 3 KHz	SSG	Rear panel	EXT.SP			1. Set the SQL knob to the closed position when the SSG output is off.	The knob position is between 8 o'clock and 11 o'clock. The BUSY LED goes off.
	2. SSG output: -14 dBμ						Check	The squelch is open. The BUSY LED goes on.

ADJUSTMENT

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Power adjustment	1. Maximum power check Frequency: 1270.000 MHz Transmit	Powermeter Ammeter	Rear panel	ANT	TX-RX	VR4	Check	11 W or more
	2. High-power adjustment Frequency: 1270.000 MHz Transmit				TX-RX	VR4	Adjust 10W	8 to 14 W (6.5 A or less)
							The fan runs when the PTT switch is pressed. (It continues for a while after the PTT switch is released, then stops.)	
	3. Low-power check Frequency: 1270.000 MHz Transmit				TX-RX	VR5	Check	0.7 to 1.4 W
2. Deviation adjustment	1. Frequency: 1270.000 MHz AG: 1 KHz, 50 mV (K,P, M, M2) 25 mV (E) Transmit	DC detector Oscilloscope	Rear panel	ANT	TX-RX	VR3	Adjust (in the higher + or − direction). 4.2 KHz	± 4.0 to 5.0 KHz
	2. Frequency: 1270.000 MHz AG: 1 KHz, 5.0 mV (K,P, M, M2) 2.5 mV (E) Transmit						Check	± 2.2 to 3.6 KHz
3. Tone check	1. Frequency: 1282.200 MHz Tone: On Transmit	DC detector Oscilloscope	Rear panel	ANT			Check	± 0.5 to 1.5 KHz
4. Protection check	1. Frequency: 1240.000 MHz 1270.000 MHz 1299.980 MHz Antenna: Open Transmit	Ammeter					Check	8.5 A or less
5. Frequency check	1. Frequency: 1270.000 MHz Transmit	Frequency counter Powermeter					1270.000 MHz	± 1 KHz

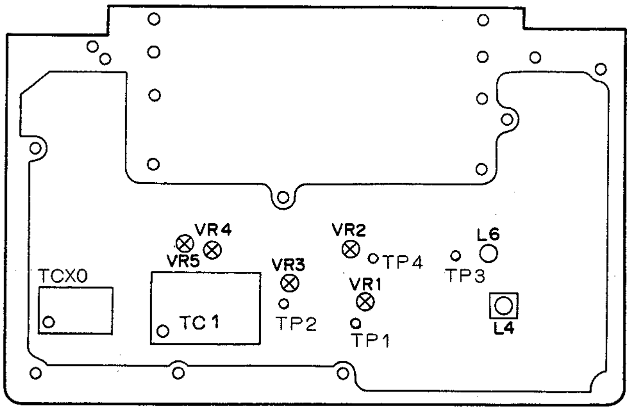


Fig. 47 1200 MHz band adjustment: Component layout (upper view)

ADJUSTMENT

- **28 MHz Band (UT-28S)**

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock Voltage check	1. Frequency: 29.700MHz Receive	Digital voltmeter	TX-RX	TP3			Check the lock voltage	5.5 - 7.0 V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Band pass filter (BPF)	1. Frequency: 29.700MHz SSG output: 0 dBμ Modulation: 1KHz Deviation: 3 KHz Receive	Digital voltmeter SSG	Rear panel	ANT	TX-RX	L1-4	Adjust so that the voltmeter reading is maximum	voltmeter reading is maximum
2. Distortion factor	1. Frequency: 28.890MHz SSG output: 60 dBμ Modulation: 1KHz Diviation: 3KHz	Distortion meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L5	Minimize the distortion factor	5% or less
3. Receive sensitivity	1. Frequency: 28.040MHz SSG output: -9 dBμ Modulation: 1KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAND or more
	2. Frequency: 29.700 MHz SSG output: -9 dBμ Modulation: 1KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
	3. Frequency: 22.040 MHz SSG output: 20 dBμ Modulation: 1KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
4. Signal strength meter adjustment	1. Frequency: 28.890 MHz SSG output: 24 dBμ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1	Adjust so that all LEDS go on, then one LED goes off.	
5. Signal strength meter check	2. Frequency: 28.890 MHz SSG output: 25 dBμ Modulation: 1 KHz Deviation: 3 KHz						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ
6. Squelch check	1. Frequency: 28.890 MHz SSG output: OFF	SSG	Rear panel	EXT.SP			Set the SQL knob to the closed position when the SSG output is off.	
	2. Frequency: 28.890 MHz SSG output: -14 dBμ Modulation: 1 KHz Deviation: 3 KHz		Rear panel	EXT.SP			The squelch is open.	

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Maximum power check	1. Frequency: 28.850 MHz Transmit	Powermeter Ammeter	Rear panel	ANT	TX-RX	VR3	Check	52 W or more
2. High-power adjustment	1. Frequency: 28.850 MHz Transmit				TX-RX	VR3	Adjust	50 W
	2. Frequency: 28.000 MHz Transmit						Check	44 W or more
	3. Frequency: 29.640 MHz Transmit						Check	44 W or more
3. Medium-power adjustment	1. Frequency: 28.850 MHz Transmit	Powermeter	Rear panel	ANT	TX-RX	VR4	Adjust	11.5 W
	2. Frequency: 28.000 MHz Transmit						Check	9.5 W or more
	3. Frequency: 29.640 MHz Transmit						Check	9.5 W or more
4. Low-power check	1. Frequency: 28.850 MHz Transmit	Powermeter	Rear panel	ANT			Check	3.0 ~ 8.0 W
	2. Frequency: 28.000 MHz Transmit						Check	3.0 ~ 8.0 W
	3. Frequency: 29.640 MHz Transmit						Check	3.0 ~ 8.0 W
5. Deviation adjustment	1. Frequency: 28.850 MHz AG: 1 KHz, 50 mV (K, P, M, M2) 25 mV (E) Filter: 25 15K Transmit	DC detector Oscilloscope AG	Rear panel	ANT	TX-RX	VR2	Adjust 4.4 KHz	± 4.4 KHz ± 200 Hz
	2. Frequency: 28.050 MHz AG: 1 KHz, 5.0 mV (K, P, M, M2) 2.5 mV (E) Filter: 25 15K Transmit						Check	± 2.2 to 3.6 KHz
6. Frequency check	1. Frequency: 28.850 MHz Transmit	Frequency counter Powermeter	Rear panel	ANT	TX-RX	TC1	Adjust	28.850 MHz ± 20 Hz
7. Protection check	1. Frequency: 29.690 MHz Antenna: Open Transmit	Ammeter					Check	12A or less

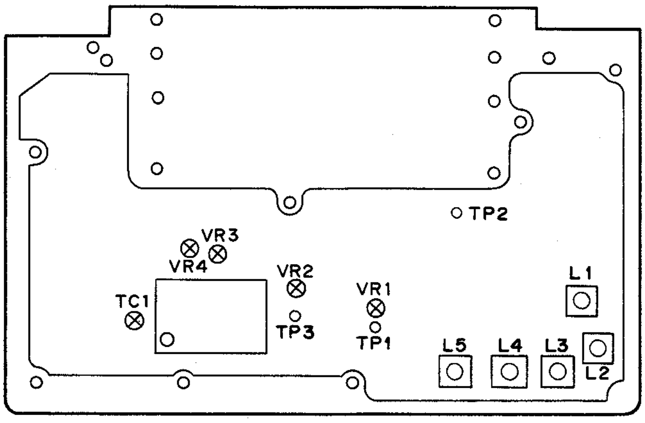


Fig. 48 28 MHz Band adjustment: Component layout (upper view)

ADJUSTMENT

● 50 MHz Band (UT-50S)

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock Voltage check	1. Frequency: 54.000 MHz Receive	Digital voltmeter	TX-RX	TP3			Check the lock voltage	6.0 - 7.6 V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Bandpass filter (BPF)	1. Frequency: 52.040 MHz SSG output: 0 dBµ Modulation: 1 KHz Deviation: 3 KHz Receive	Digital voltmeter SSG	Rear panel	ANT	TX-RX	L1~4	Adjust to that the voltmeter reading is maximum	voltmeter reading is maximum
2. Distortion factor	1. Frequency: 52.040 MHz SSG output: 60 dBµ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Oscilloscope SSG	Rear panel	EXT.SP	TX-RX	L5	Minimize the distortion factor	5% or less
3. Receive sensitivity	1. Frequency: 53.940 MHz SSG output: -9 dBµ Modulation: 1 KHz Deviation: 3 KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear panel	EXT.SP			Check	12 dB SINAND or more
	2. Frequency: 50.040 MHz SSG output: -9 dBµ Modulation: 1 KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
	3. Frequency: 40.040 MHz SSG output: 20 dBµ Modulation: 1 KHz Deviation: 3 KHz		Rear panel	EXT.SP			Check	12 dB SINAND or more
4. Signal strength meter adjustment	1. Frequency: 52.040 MHz SSG output: 24 dBµ Modulation: 1 KHz Deviation: 3 KHz	SSG			TX-RX	VR1	Adjust so that all LEDs go on, then one LED goes off.	
5. Signal strength meter check	2. Frequency: 52.040 MHz SSG output: 25 dBµ Modulation: 1 KHz Deviation: 3 KHz						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBµ
6. Squelch check	1. Frequency: 52.040 MHz SSG output: Off	SSG	Rear panel	EXT.SP			Set the SQL knob to the closed position when the SSG output is off.	
	2. Frequency: 52.040 MHz SSG output: -14 dB Modulation: 1 KHz Deviation: 3 KHz		Rear panel	EXT.SP			The squelch is open.	

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Maximum power check	1. Frequency: 52.000 MHz Transmit	Powermeter Ammeter	Rear Panel	ANT	TX-RX	VR3	Check	53W or more
2. High-power adjustment	1. Frequency: 52.000 MHz Transmit				TX-RX	VR3	Adjust	51W
	2. Frequency: 50.000 MHz Transmit						Check	45W or more
	3. Frequency: 53.940 MHz Transmit						Check	45W or more
3. Medium-power adjustment	1. Frequency: 52.000 MHz Transmit	Powermeter	Rear Panel	ANT	TX-RX	VR4	Adjust	11.5W
	2. Frequency: 50.000 MHz Transmit						Check	9.5W or more
	3. Frequency: 53.940 MHz Transmit						Check	9.5W or more
4. Low-power check	1. Frequency: 52.000 MHz Transmit	Powermeter	Rear Panel	ANT			Check	3.0 ~ 8.0W
	2. Frequency: 50.000 MHz Transmit						Check	3.0 ~ 8.0W
	3. Frequency: 53.940 MHz Transmit						Check	3.0 ~ 8.0W
5. Deviation adjustment	1. Frequency: 52.000 MHz AG: 1KHz, 50 mV (K, P,M, M2) 25 mV (E) Filter: 25 15K Transmit	DC detector Oscilloscope AG	Rear Panel	ANT	TX-RX	VR2	Adjust 4.4 KHz	±4.4 KHz ± 200 Hz
	2. Frequency: 52.000 MHz AG: 1KHz, 5.0 mV (K, P,M, M2) 2.5 mV (E) Filter: 25 15K Transmit						Check	±2.2 to 3.6 KHz
6. Frequency check.	1. Frequency: 52.000 MHz Transmit	Frequency counter Powermeter	Rear Panel	ANT	TX-RX	TC1	Adjust	52.000 MHz ± 20 Hz
7. Protection check	1. Frequency: 53.990MHz Antenna: Open Transmit	Ammeter					Check	12A or less.

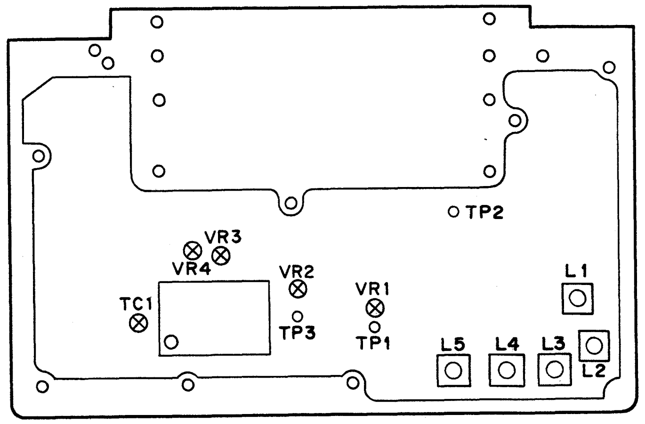


Fig. 49 50 MHz BAND adjustment: Component layout (upper view)

• 220 MHz Band (TM-641A, UT-220S)

Common Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Lock voltage check	1. Frequency: 215.000 MHz Receive	Digital voltmeter	TX-RX	TP2			Check the lock voltage	1.2 ~ 2.6V

Receiver Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Bandpass filter (BPF)	1. Frequency: 222.540 MHz SSG output: 0dBμ Modulation: 1KHz Deviation: 3KHz Receive	Digital voltmeter SSG	Rear Panel	ANT.	TX-RX	L1~4	Voltmeter reading is maximum.	Voltmeter reading is maximum.
2. Distortion factor	1. Frequency: 222.540 MHz SSG output: 60dBμ Modulation: 1KHz Deviation: 3KHz	Distortion meter Oscilloscope SSG	Rear Panel	EXT. SP	TX-RX	L6	Minimize the distortion factor	5% or less
3. Receive sensitivity	1. Frequency: 222.540 MHz SSG output: -9dBμ Modulation: 1KHz Deviation: 3KHz	Distortion meter Millivoltmeter Oscilloscope SSG	Rear Panel	EXT. SP			Check	12dB SINAND or more
	2. Frequency: 215.040 MHz SSG output: 5dBμ Modulation: 1KHz Deviation: 3KHz		Rear panel	EXT. SP			Check	12dB SINAND or more
	3. Frequency: 229.980 MHz SSG output: -5dBμ Modulation: 1KHz Deviation: 3KHz		Rear panel	EXT. SP			Check	12dB SINAND or more
4. Signal strength meter adjustment	1. Frequency: 222.540 MHz SSG output: 21dBμ Modulation: 1KHz Deviation: 3KHz	SSG			TX-RX	VR1	Adjust so that all LEDs go on, then one LED goes off.	
5. Signal strength meter check	2. Frequency: 222.540 MHz SSG output: 22dBμ Modulation: 1KHz Deviation: 3KHz						Adjust the SSG output so that all signal strength meter LEDs go on.	The SSG output is 20 ± 6 dBμ
6. Squelch check	1. Frequency: 222.540 MHz SSG output: OFF	SSG	Rear Panel	EXT. SP			Set the SQL knob to the closed position when the SSG output is off.	
	2. Frequency: 222.540 MHz SSG output: -14dB Modulation: 1KHz Deviation: 3KHz		Rear Panel	EXT. SP			The squelch is open.	

Transmitter Section Adjustment

Item	Condition	Measurement point			Adjustment point			Specification
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Maximum power check	1. Frequency: 222.500 MHz Transmit	Powermeter Ammeter	Rear Panel	ANT	TX-RX	VR3	Check	28W or more (reference)
2. High-power adjustment	1. Frequency: 222.500 MHz Transmit				TX-RX	VR3	Adjust	26W
	2. Frequency: 222.000 MHz Transmit						Check	22W or more
	3. Frequency: 224.980 MHz Transmit						Check	22W or more
3. Medium-power adjustment	1. Frequency: 222.540 MHz Transmit	Powermeter	Rear Panel	ANT	TX-RX	VR4	Adjust	11W
	2. Frequency: 222.000 MHz Transmit						Check	9W or more
	3. Frequency: 224.980 MHz Transmit						Check	9W or more
4. Low-power check	1. Frequency: 222.540 MHz Transmit	Powermeter	Rear Panel	ANT			Check	3.0 ~ 8.0W
	2. Frequency: 220.000 MHz Transmit						Check	3.0 ~ 8.0W
	3. Frequency: 222.980 MHz Transmit						Check	3.0 ~ 8.0W
5. Deviation adjustment	1. Frequency: 222.500 MHz AG: 1KHz, 50 mV Filter: 25 15K Transmit	DC detector Oscilloscope AG	Rear Panel	ANT	TX-RX	VR2	Adjust 4.4 KHz	±4.4KHz ± 200 Hz
	2. Frequency: 222.500 MHz AG: 1KHz, 5.0 mV Filter: 25 15K Transmit						Check	±2.2 to 3.6 KHz
6. Frequency check.	1. Frequency: 222.500 MHz Transmit	Frequency counter Powermeter	Rear Panel	ANT	TX-RX	TC1	Adjust	222.500 MHz ± 2KHz
7. Protection check	1. Frequency: 224.980 MHz Antenna: Open Transmit	Ammeter					Check	7.5A or less

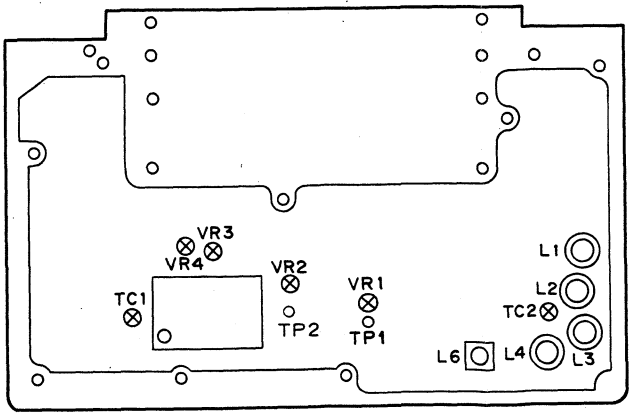


Fig. 50 220 MHz band adjustment: Component layout (upper view)

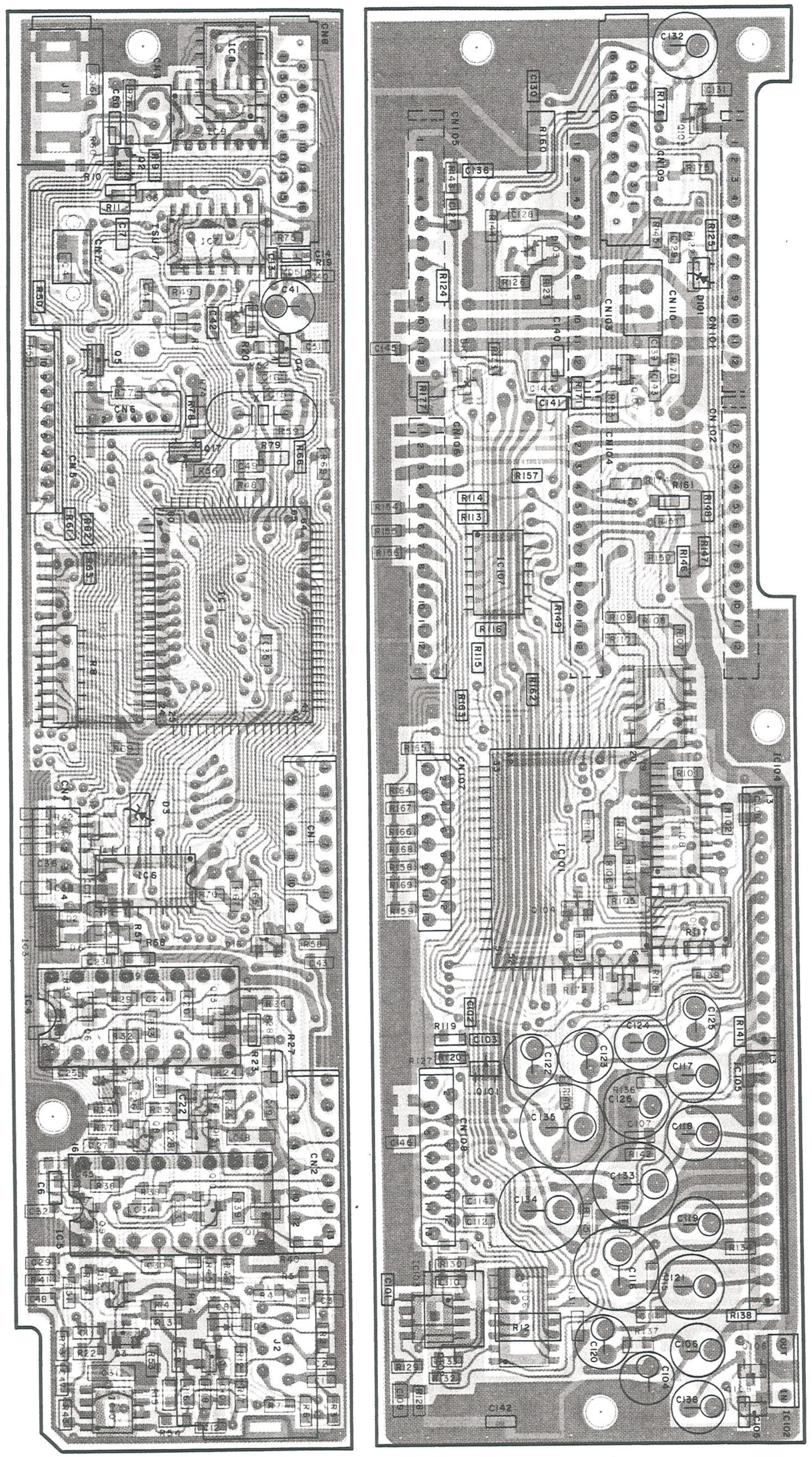
TM-641A/741A/741E

PC BOARD VIEW

CONTROL UNIT X53-331X-XX 0-12: 641A(K),741A (K, P, M, M2), 2-71: 741 E (E)

Component side view

IC1:75517GF-014-3B9 IC2:LC3564PML-12, 15 IC3:TA78L06F IC4, 5:TC9154AP IC6, 7:BU4094BF IC8, 9:BU4053BF IC10:NJM4558E IC11, 12:TC4S11F
Q1:2SC3324 (G) Q2, 4~8, 17:2SC2712(Y) Q3,9~11:DTC114EK Q12~15:2SD175 (K) Q16:2SA1519
D1:1SS184 D2, 4, 6:LFB01 D3:02CZ6.8X D5:02CZ3.0(Z)



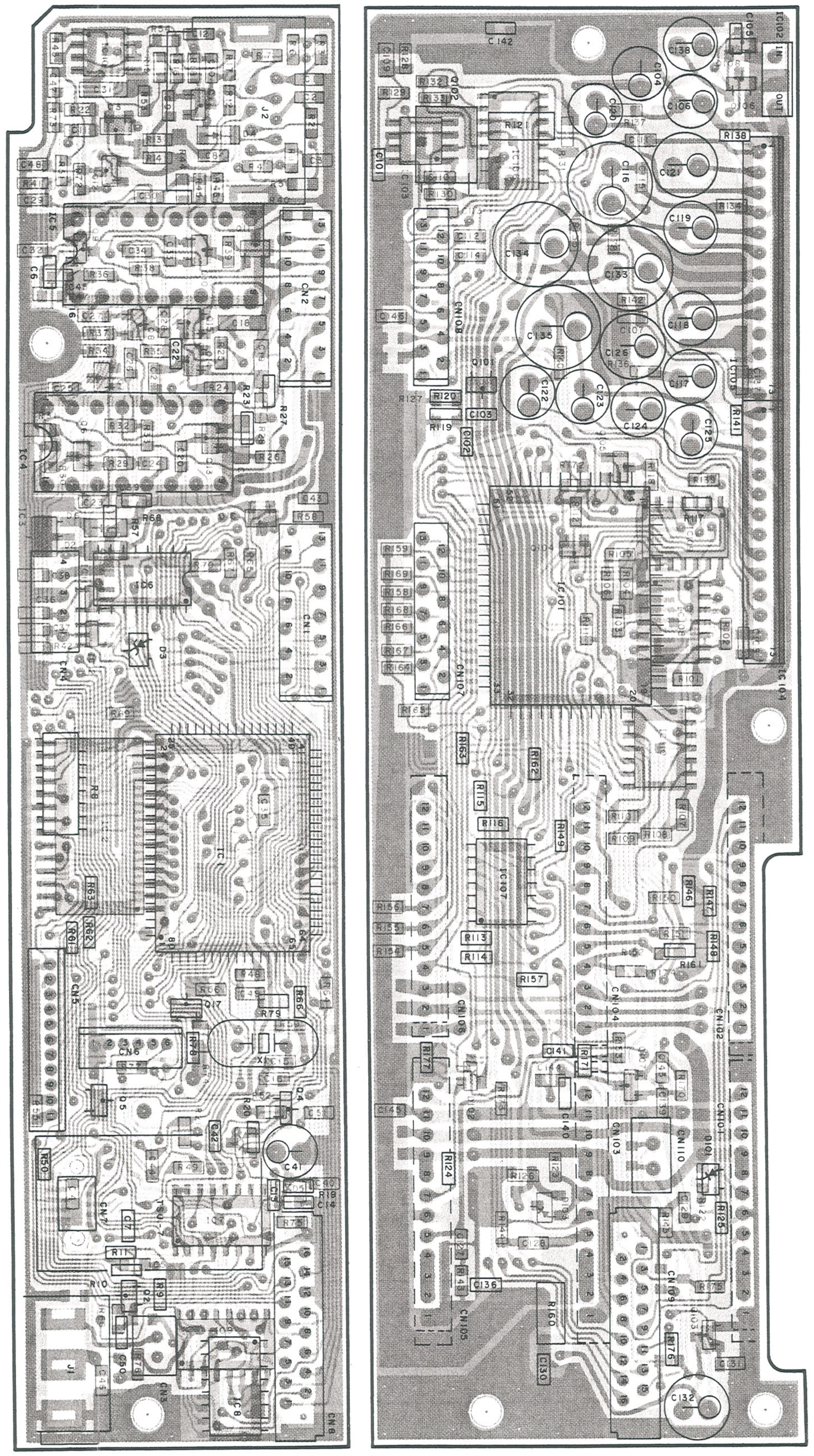
IC101:CXD1095Q IC102: MC78T08CT IC103:NJM4558E IC104, 105:LA4446 IC106:BU4053BF IC107~110:BU4066BF
Q101,107:2SC2712(Y) Q102:2SA1641(S, T) Q103:DTD143EK Q104,105:DTC114EK Q106:DTC144EK Q108:DTA144EK
D101~103:1SS226

▨:Component side pattern ▨:Foil side pattern

CONTROL UNIT X53-331X-XX 0-12: 641A(K), 741A (K, P, M, M2), 2-71: 741 E (E)

Foil side view

IC1:75517GF-014-3B9 IC2:LC3564PML-12, 15 IC3:TA78L06F IC4, 5:TC9154AP IC6, 7:BU4094BF IC8, 9:BU4053BF IC10:NJM4558E IC11, 12:TC4S11F
Q1:2SC3324 (G) Q2, 4~8, 17:2SC2712(Y) Q3,9~11:DTC114EK Q12~15:2SD175 (K) Q16:2SA1519
D1:1SS184 D2, 4, 6:LFB01 D3:02CZ6.8X D5:02CZ3.0(Z)



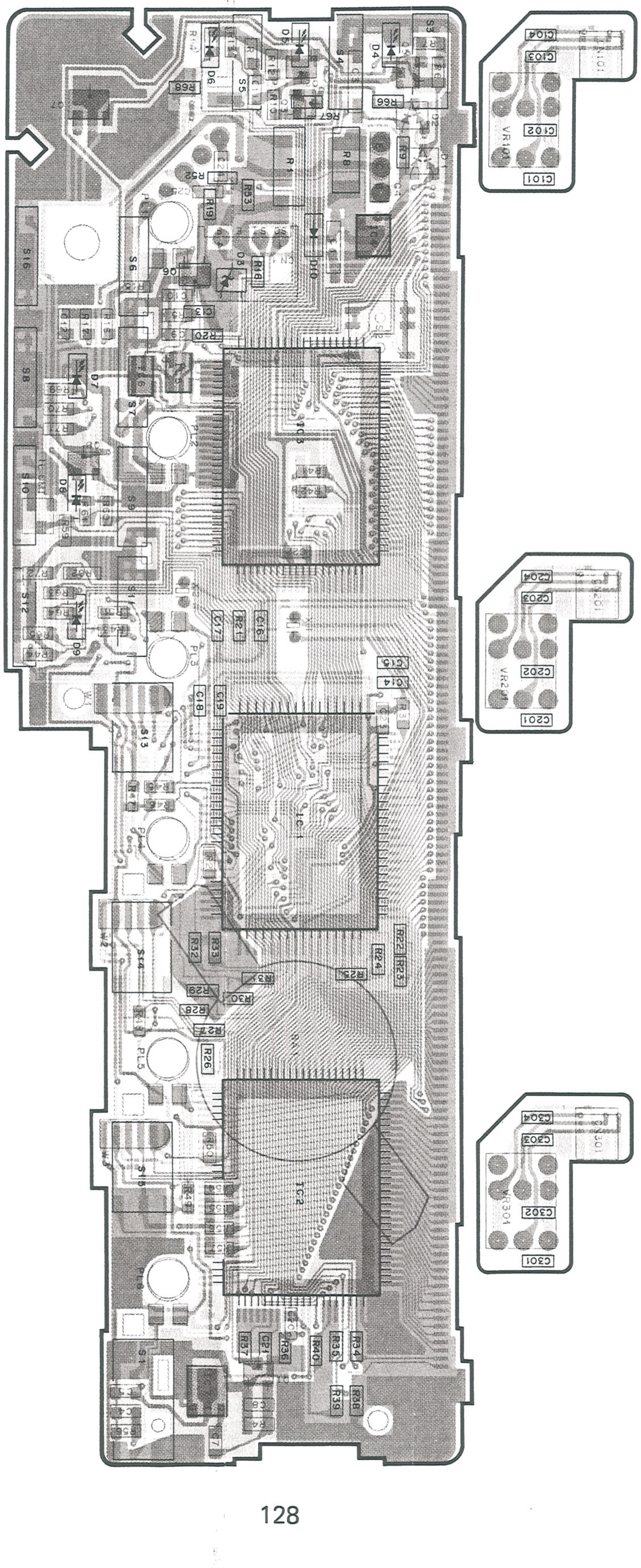
IC101:CXD1095Q IC102:MC78T08CT IC103:NJM4558E IC104, 105:LA4446 IC106:BU4053BF IC107~110:BU4066BF
Q101, 107:2SC2712(Y) Q102:2SA1641(S, T) Q103:DTD143EK Q104, 105:DTC114EK Q106:DTC144EK Q108:DTA144EK
D101~103:1SS226

▨:Component side pattern ▨:Foil side pattern

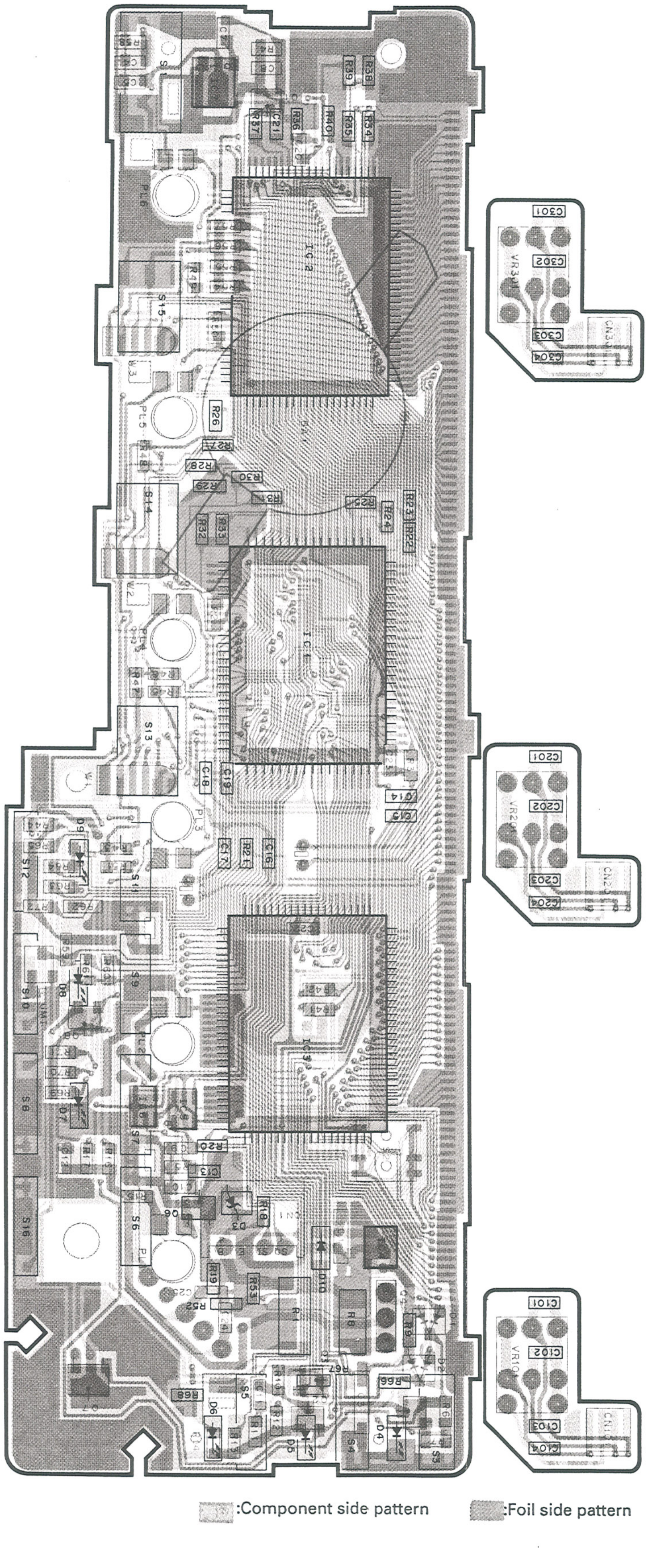
DISPLAY UNIT X54-312X-XX 0-11: 641A(K), 741A(K, P), 0-21:741A(M), 0-22:741A(M2), 2-71:741E(E)

Component side view

IC1: 75516GF-270-3B9 IC2,3:MSM5265GS-V1K IC4: TA78L06F IC5,6: TC4S11F IC7: S-8054ALR-LN Q1,3,6: 2SC2712(Y) Q2: 2SA1162(Y) Q4: 2SA1307(Y) Q5: 2SA1162(Y) Q7: 2SD1624(S,T) Q8: DTA114EK D1,2: 1SS184 D3: 02CZ7.5(X,Y) D4~9: B30-2108-05 D10: LFB01


IC1
IC2
IC3
VR101
VR201
VR301
C101
C102
C103
C104
C201
C202
C203
C204
C301
C302
C303
C304
PL3
PL5
S1
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S16
R8
R9
R19
R26
R32
R33
R66
R67
R68

Foil side view

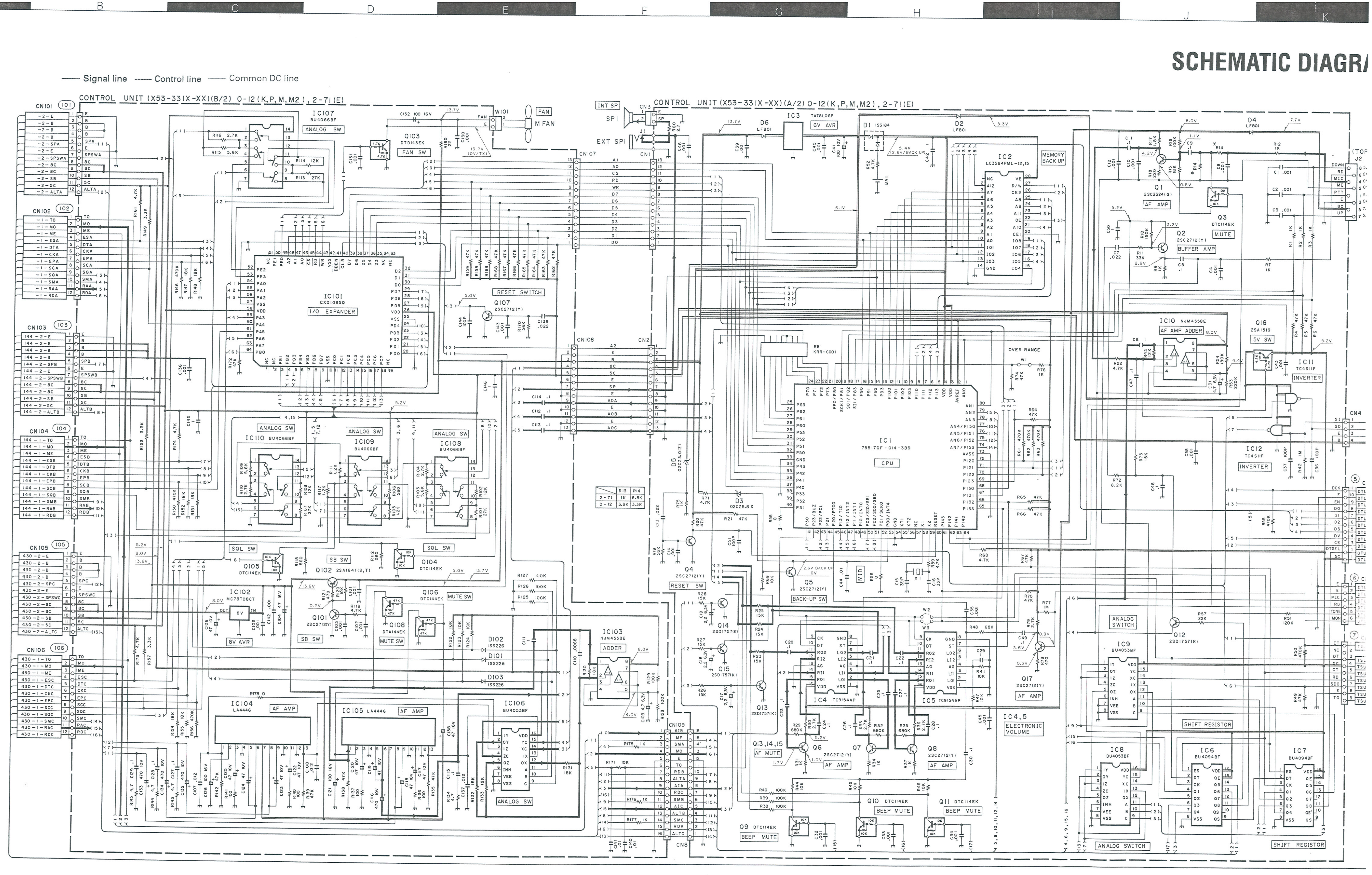

IC1
IC2
IC3
VR101
VR201
VR301
C101
C102
C103
C104
C201
C202
C203
C204
C301
C302
C303
C304
PL5
PL6
S4
S5
S6
S9
S10
S12
S13
S14
S15
S16
R8
R19
R26
R32
R33
R66
R67
R68

IC1: 75516GF-270-3B9 IC2,3:MSM5265GS-V1K IC4: TA78L06F IC5,6: TC4S11F IC7: S-8054ALR-LN Q1,3,6: 2SC2712(Y) Q2: 2SA1162(Y) Q4: 2SA1307(Y) Q5: 2SA1162(Y) Q7: 2SD1624(S,T) Q8: DTA114EK D1,2: 1SS184 D3: 02CZ7.5(X,Y) D4~9: B30-2108-05 D10: LFB01

▨:Component side pattern ▨:Foil side pattern

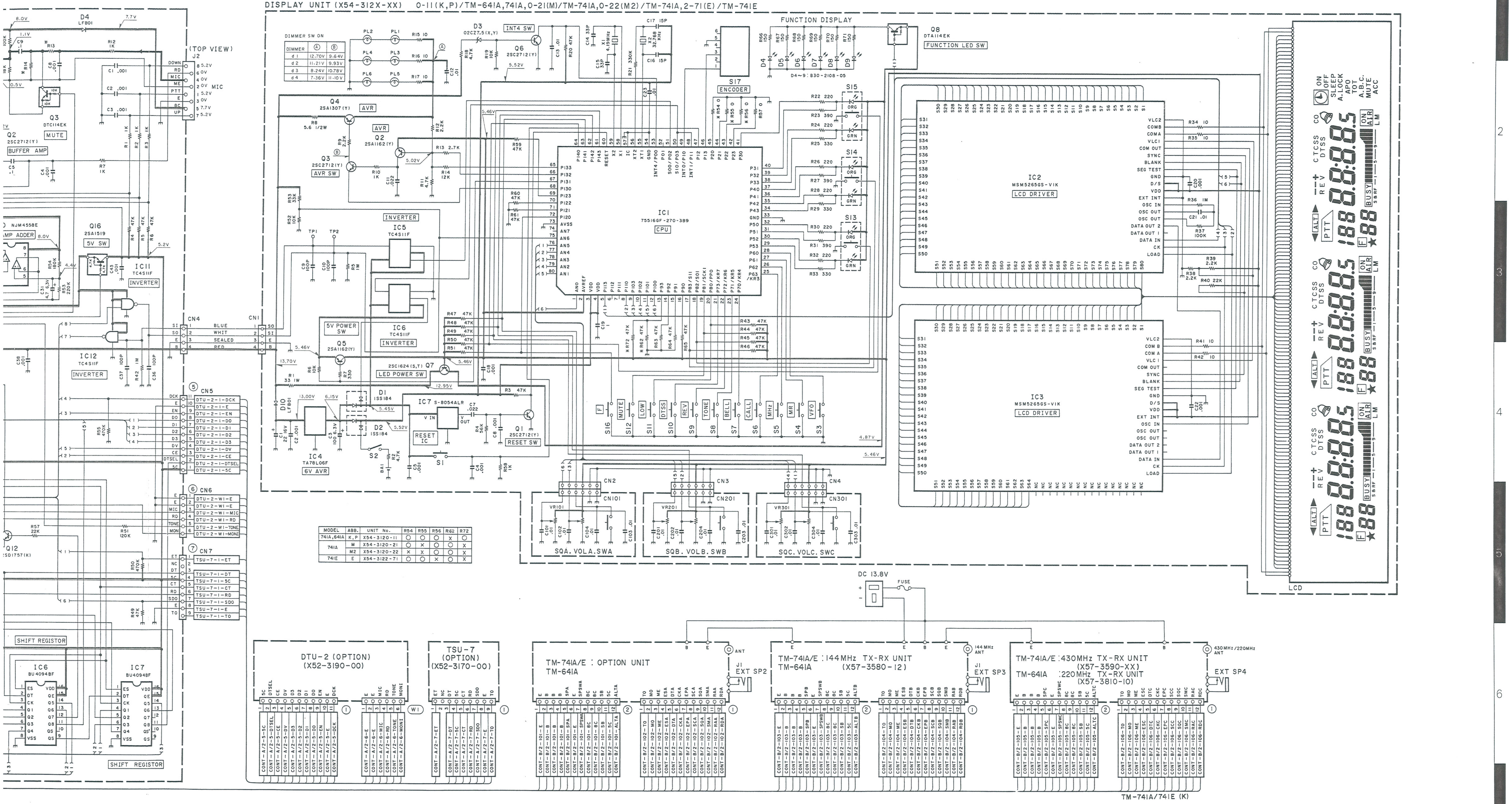
SCHEMATIC DIAGRA

—— Signal line ------ Control line —— Common DC line


A
B
C
D
E
F
G
H
I
J
K
CONTROL UNIT (X53-331X-XX)(B/2) 0-12(K,P,M,M2), 2-71(E)
CONTROL UNIT (X53-331X-XX)(A/2) 0-12(K,P,M,M2), 2-71(E)
CN101
CN102
CN103
CN104
CN105
CN106
CN107
CN108
CN109
CN1
CN2
CN3
CN4
CN8
W101
FAN
M FAN
INT SP
SP1
EXT SP
J1
IC107 BU4066BF ANALOG SW
Q103 DTD143EK FAN SW
IC101 CXD1095Q I/O EXPANDER
Q107 2SC2712(Y) RESET SWITCH
IC110 BU4066BF ANALOG SW
IC109 BU4066BF ANALOG SW
IC108 BU4066BF ANALOG SW
Q105 DTC114EK SQL SW
Q104 DTC114EK SQL SW
Q102 2SA1641(S,T) SB SW
Q101 2SC2712(Y) SB SW
Q106 DTC144EK MUTE SW
Q108 DTA144EK MUTE SW
IC102 MC78T08CT 8V AVR
IC103 NJM4558E ADDER
D101 1SS226
D102 1SS226
D103 1SS226
IC104 LA4446 AF AMP
IC105 LA4446 AF AMP
IC106 BU4053BF ANALOG SW
IC3 TA78L06F 6V AVR
D6 LFB01
D1 1SS184
D2 LFB01
IC2 LC3564PML-12,15 MEMORY BACK UP
D4 LFB01
Q1 2SC3324(G) AF AMP
Q2 2SC2712(Y) BUFFER AMP
Q3 DTC114EK MUTE
IC1 75517GF-014-3B9 CPU
R8 KRR-C001
OVER RANGE
D5 02CZ3.0(Z)
D3 02CZ6.8X
Q4 2SC2712(Y) RESET SW
Q5 2SC2712(Y) BACK-UP SW
Q14 2SD1757(K)
Q15 2SD1757(K)
Q13 2SD1757(K)
Q13,14,15 AF MUTE
IC4 TC9154AP
IC5 TC9154AP
IC4,5 ELECTRONIC VOLUME
Q6 2SC2712(Y) AF AMP
Q7
Q8 2SC2712(Y) AF AMP
Q9 DTC114EK BEEP MUTE
Q10 DTC114EK BEEP MUTE
Q11 DTC114EK BEEP MUTE
Q17 2SC2712(Y) AF AMP
IC10 NJM4558E AF AMP ADDER
Q16 2SA1519 5V SW
IC11 TC4S11F INVERTER
IC12 TC4S11F INVERTER
Q12 2SD1757(K)
IC9 BU4053BF ANALOG SWITCH
IC8 BU4053BF ANALOG SWITCH
IC6 BU4094BF SHIFT REGISTOR
IC7 BU4094BF SHIFT REGISTOR
(TOP) J2
DOWN
RD
MIC
ME
PTT
E
8C
UP

SCHEMATIC DIAGRAM

TM-641A/741A/741E


DISPLAY UNIT (X54-312X-XX) 0-11(K,P)/TM-641A,741A,0-21(M)/TM-741A,0-22(M2)/TM-741A,2-71(E)/TM-741E
IC1 75516GF-270-389 CPU
IC2 MSM5265GS-VIK LCD DRIVER
IC3 MSM5265GS-VIK LCD DRIVER
IC4 TA78L06F 6V AVR
IC5 TC4S11F INVERTER
IC6 TC4S11F INVERTER
IC7 S-8054ALR RESET IC
IC11 TC4S11F INVERTER
IC12 TC4S11F INVERTER
IC6 BU4094BF
IC7 BU4094BF
SHIFT REGISTOR
FUNCTION DISPLAY
FUNCTION LED SW
S17 ENCODER
LCD
DC 13.8V
FUSE
DTU-2 (OPTION) (X52-3190-00)
TSU-7 (OPTION) (X52-3170-00)
TM-741A/E : OPTION UNIT TM-641A
TM-741A/E : 144MHz TX-RX UNIT TM-641A (X57-3580-12)
TM-741A/E : 430MHz TX-RX UNIT (X57-3590-XX) TM-641A : 220MHz TX-RX UNIT (X57-3810-10)
EXT SP2
EXT SP3
EXT SP4
SQA. VOLA.SWA
SQB. VOLB.SWB
SQC. VOLC. SWC
TM-741A/741E (K)

DIMMER SW ON

DIMMER	Ⓐ	Ⓑ
d 1	12.70V	9.64V
d 2	11.21V	9.93V
d 3	8.24V	10.78V
d 4	7.36V	11.10V

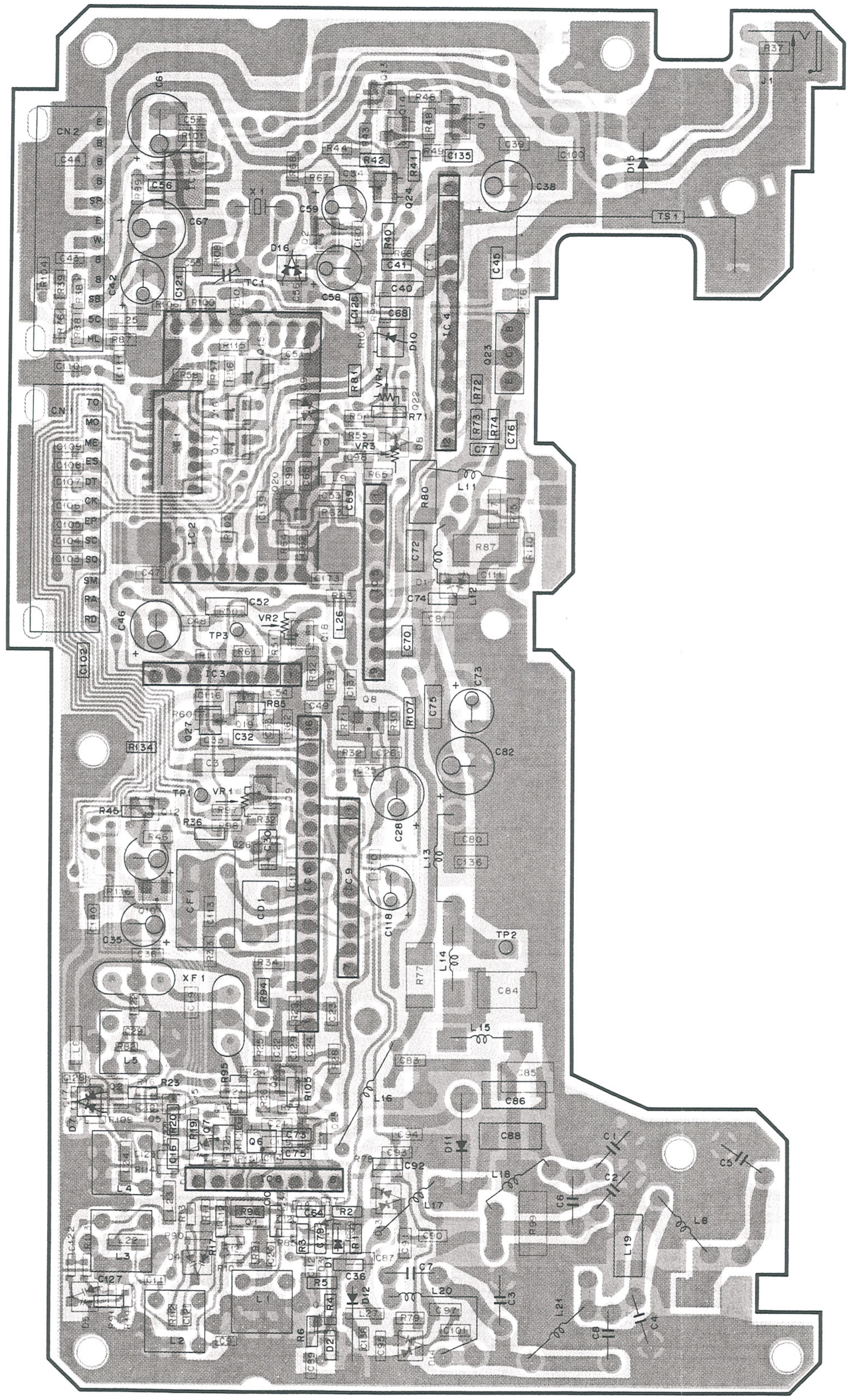
MODEL	ABB.	UNIT No.	R54	R55	R56	R62	R72
741A,641A	K, P	X54-3120-11	○	○	○	X	○
741A	M	X54-3120-21	○	X	○	○	X
	M2	X54-3120-22	X	X	○	○	X
741E	E	X54-3122-71	○	○	X	○	X

TM-641A/741A/741E

28 M TX-RX UNIT (X57-3790-01) :UT-28S(M)

Component side view

IC1: BU4094BF IC2: KCH09 IC3: KCA04 IC4: KCB16 IC5: KCC04 IC6: KCD04 IC7: LA5009M IC8: KCB17 IC9: KCD05 Q1: 3SK179(L) Q2: 3SK131(V12)
Q3, 8,20, 2SC2714(Y) Q4,5: DTC144EU Q6,7, 25: DTA114EK Q9: 2SJ106(GR) Q10: 2SA1362(Y) Q11: 2SB1119S Q12: DTC144WK Q13: FMW1
Q14, 21,24: 2SC2712(Y) Q15~17, 27 DTC144EK Q18: 2SD1757(K) Q19: 2SK208(Y) Q22: FMG1 Q23: 2SD1902R Q26: DTC143EK D1,2: MA77
D3~6: 1SV228 D7, 9: DAN235(K) D8: ISS184 D10: 1SS181 D11: UM9401 D12: MI308 D13,14: 1SS226 D15: DSA3A1 D16,17: 1SS184


CN2
CN1
J1
R37
TS1
D15
C38
C39
C45
C135
IC4
Q23
C56
C57
C59
C58
D16
TC1
C40
C41
C68
D10
IC2
VR3
R80
L11
C72
C74
R87
C46
C52
VR2
TP3
IC3
C70
C75
C73
C82
R134
R60
C32
R85
Q8
R107
VR1
TP1
R46
C28
L13
C80
C136
C9
CF1
CD1
C118
TP2
C36
L14
R77
C84
XF1
L15
L5
R25
L16
C83
C85
C86
C88
D11
Q6
C92
C1
C2
L18
C5
C6
L17
L8
L19
L20
C3
L21
C4
C7
D12
R6
L1
L2

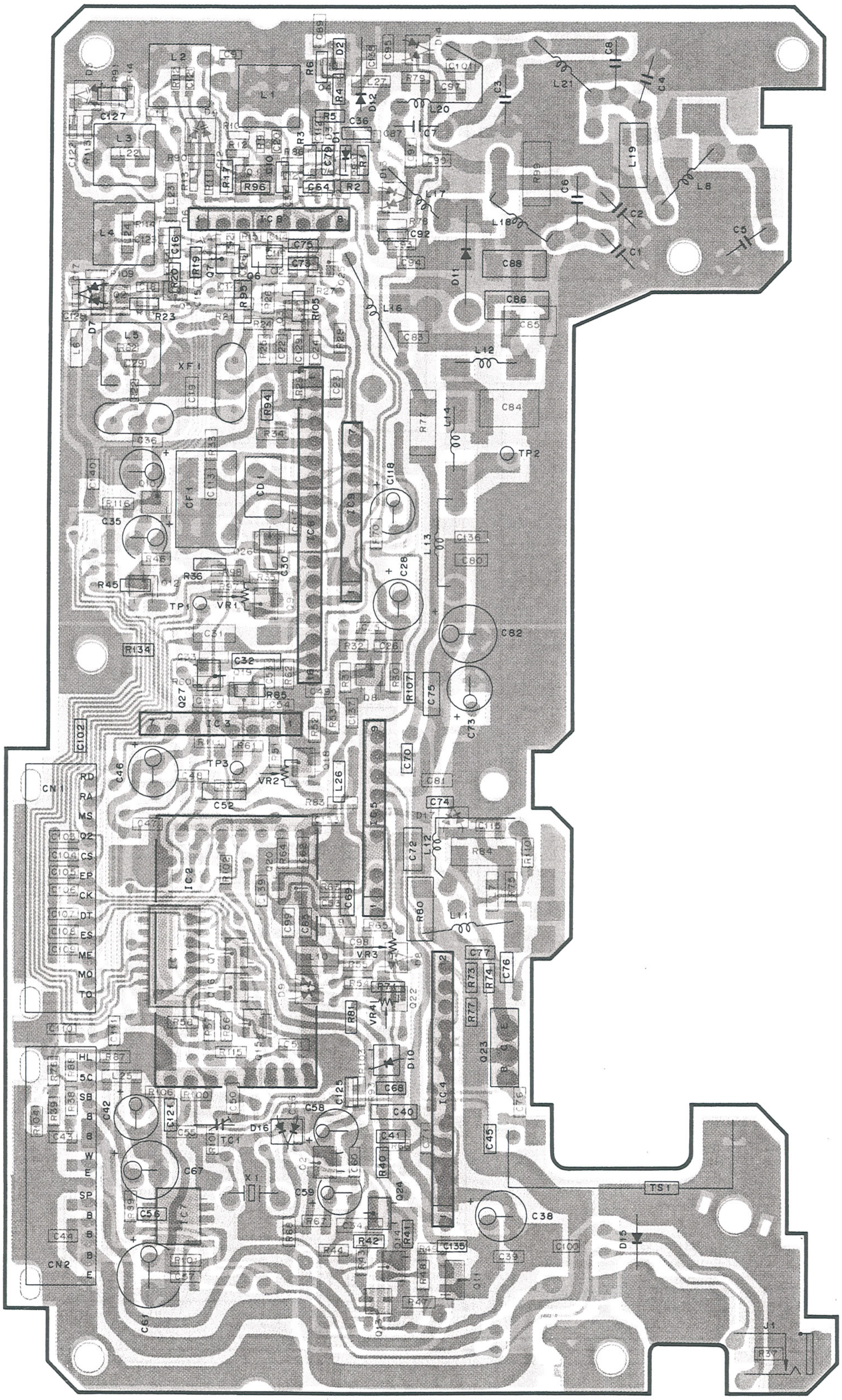
▨ :Component side pattern ▨ :Foil side pattern

PC BOARD VIEW

28 M TX-RX UNIT (X57-3790-01) :UT-28S(M)

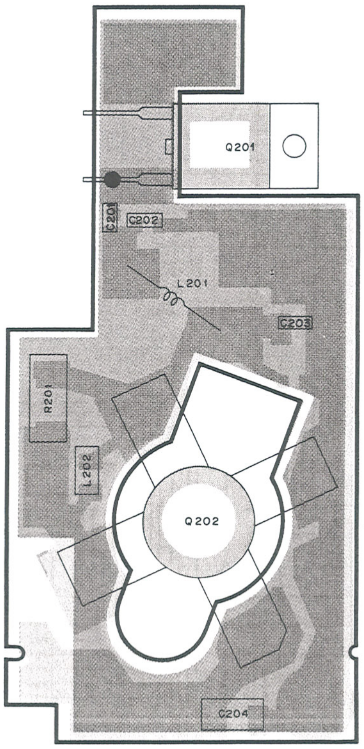
Foil side view

IC1: BU4094BF IC2: KCH09 IC3: KCA04 IC4: KCB16 IC5: KCC04 IC6: KCD04 IC7: LA5009M IC8: KCB17 IC9: KCD05 Q1: 3SK179(L) Q2: 3SK131(V12)
Q3, 8,20: 2SC2714(Y) Q4,5: DTC144EU Q6,7, 25: DTA114EK Q9: 2SJ106(GR) Q10: 2SA1362(Y) Q11: 2SB1119S Q12: DTC144WK Q13: FMW1
Q14, 21, 24: 2SC2712(Y) Q15~17, 27 DTC144EK Q18: 2SD1757(K) Q19: 2SK208(Y) Q22: FMG1 Q23: 2SD1902R Q26: DTC143EK D1,2: MA77
D3~6: 1SV228 D7, 9: DAN235(K) D8: ISS184 D10: 1SS181 D11: UM9401 D12: MI308 D13,14: 1SS226 D15: DSA3A1 D16,17: 1SS184


L2
L1
L3
L4
L5
L6
L8
L12
L13
L14
L16
L17
L18
L19
L20
L21
L26
C1
C2
C3
C4
C5
C6
C8
C28
C35
C36
C38
C42
C46
C58
C61
C67
C73
C82
C84
C86
C88
C118
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
D10
D11
D15
D16
XF1
CF1
CD1
VR1
VR2
VR3
VR4
TP1
TP2
TP3
TS1
TC1
X1
J1
CN1
CN2
RD
RA
MS
02
CS
EP
CK
DT
ES
ME
MO
TO
HL
5C
SB
B
W
E
SP

SUB UNIT (X58-3840-01)

Component side view


Q201
Q202
C201
C202
C203
C204
L201
L202
R201

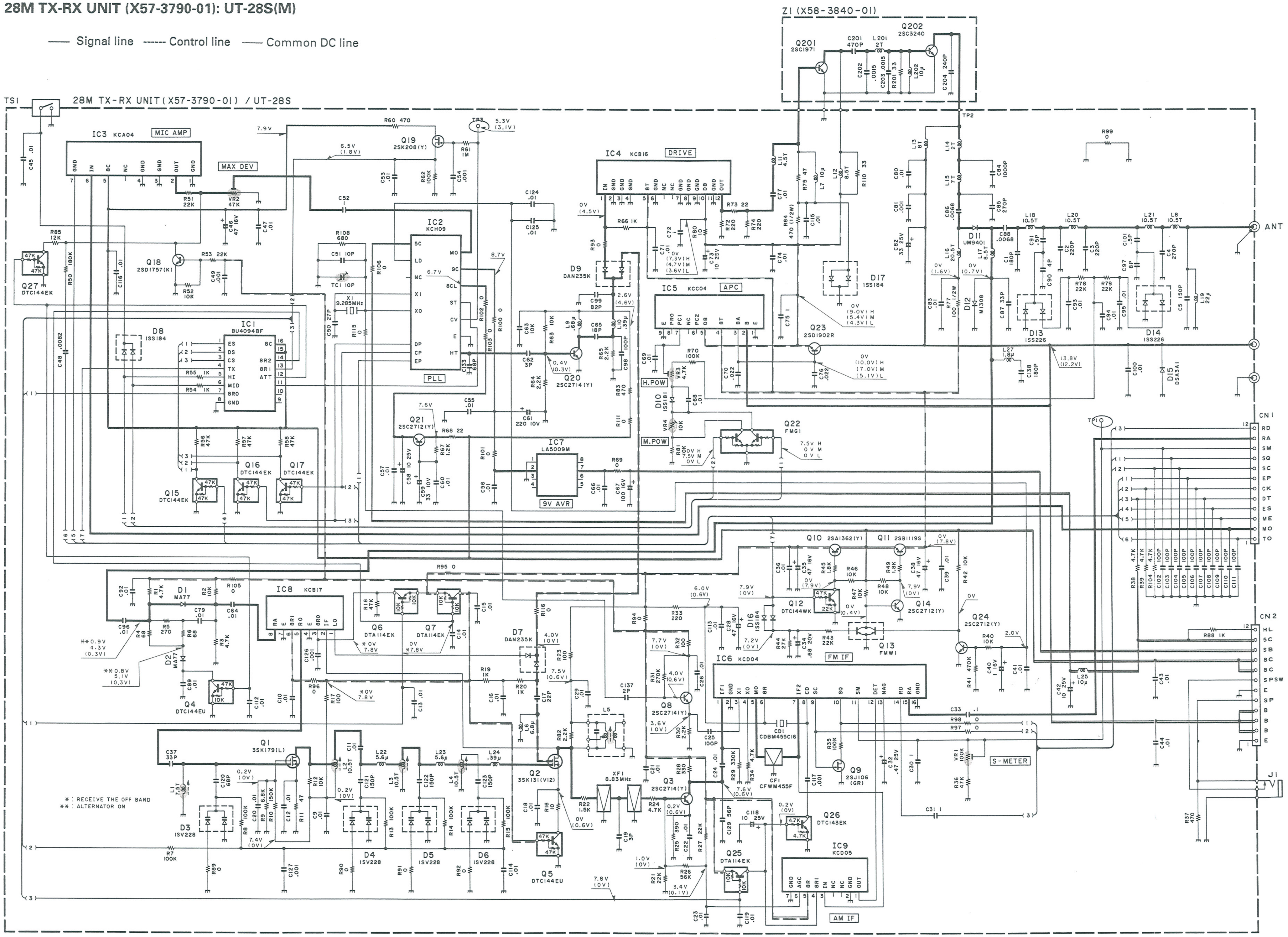
▨ :Component side pattern ▨ :Foil side pattern

SCHEMATIC DIAGRAM

TM-641A/741A/741E

28M TX-RX UNIT (X57-3790-01): UT-28S(M)

— Signal line ------ Control line — Common DC line


Z1 (X58-3840-01)
Q201 2SC1971
Q202 2SC3240
TS1
28M TX-RX UNIT (X57-3790-01) / UT-28S
IC3 KCA04 MIC AMP
MAX DEV
Q19 2SK208(Y)
TP3 5.3V (3.1V)
IC4 KCB16 DRIVE
IC2 KCH09
IC1 BU4094BF
PLL
Q18 2SD1757(K)
Q27 DTC144EK
D8 1SS184
Q15 DTC144EK
Q16 DTC144EK
Q17 DTC144EK
Q21 2SC2712(Y)
IC7 LA5009M 9V AVR
Q20 2SC2714(Y)
D9 DAN235K
IC5 KCC04 APC
H.POW
M.POW
D10 1SS181
Q22 FMG1
Q23 2SD1902R
D17 1SS184
D11 UM9401
D12 M1308
D13 1SS226
D14 1SS226
D15 DSA3A1
ANT
CN1
RD RA SM SQ SC EP CK DT ES ME MO TO
TP1
Q10 2SA1362(Y)
Q11 2SB1119S
Q12 DTC144WK
Q13 FMW1
Q14 2SC2712(Y)
Q24 2SC2712(Y)
D16 1SS184
FM IF
IC6 KCD04
CN2
HL 5C SB 8C 8C SPSW E SP B B B E
S-METER
J1
IC8 KCB17
D1 MA77
D2 MA77
Q4 DTC144EU
Q6 DTA114EK
Q7 DTA114EK
D7 DAN235K
Q1 3SK179(L)
D3 1SV228
D4 1SV228
D5 1SV228
D6 1SV228
Q2 3SK131(V12)
Q5 DTC144EU
XF1 8.83MHz
Q3 2SC2714(Y)
Q8 2SC2714(Y)
CD1 CDBM455C16
CF1 CFWM455F
Q9 2SJ106 (GR)
Q25 DTA114EK
Q26 DTC143EK
IC9 KCD05
AM IF
∗: RECEIVE THE OFF BAND
∗∗: ALTERNATOR ON

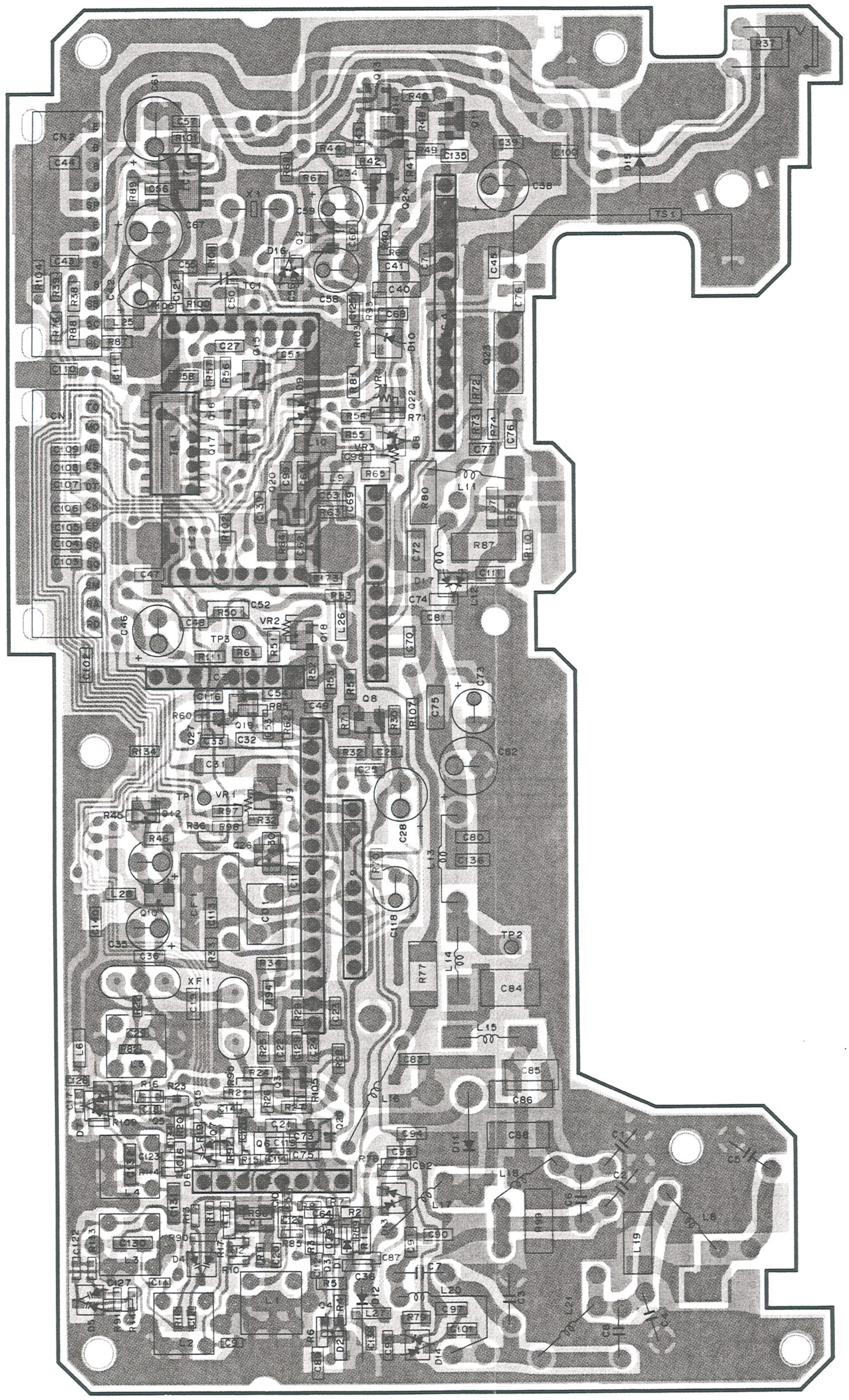
TM-641A/741A/741E

PC BOARD VIEW

50M TX-RX UNIT (X57-3800-01) :UT-50S (M)

Component side view

IC1: BU4094BF IC2: KCH10 IC3: KCA04 IC4: KCB18 IC5: KCC04 IC6: KCD04 IC7: LA5010M IC8: KCB19 IC9: KCD05 Q1: 3SK184(S) Q2: 3SK131(V12)
Q3,8,20: 2SC2714(Y) Q4,15~17: DTC144EK Q5: DTC144EU Q6,7,25: DTA114EK Q9: 2SJ106(GR) Q10: 2SA1362(Y) Q11: 2SB1119S Q12: DTC144WK
Q13: EMW1 Q14,21,24: 2SC2712(Y) Q18: 2SD1757K Q19: 2SK208(Y) Q22: FMG1 Q23: 2SD1902R Q26: DTC143EK D1,2: MA77 D3~6: 1SV228 D7,9: DAN235(K)
D8,16,17: 1SS184 D10: 1SS181 D11: MI407 D12: MI308 D13,14: 1SS226 D15: DSA3A1

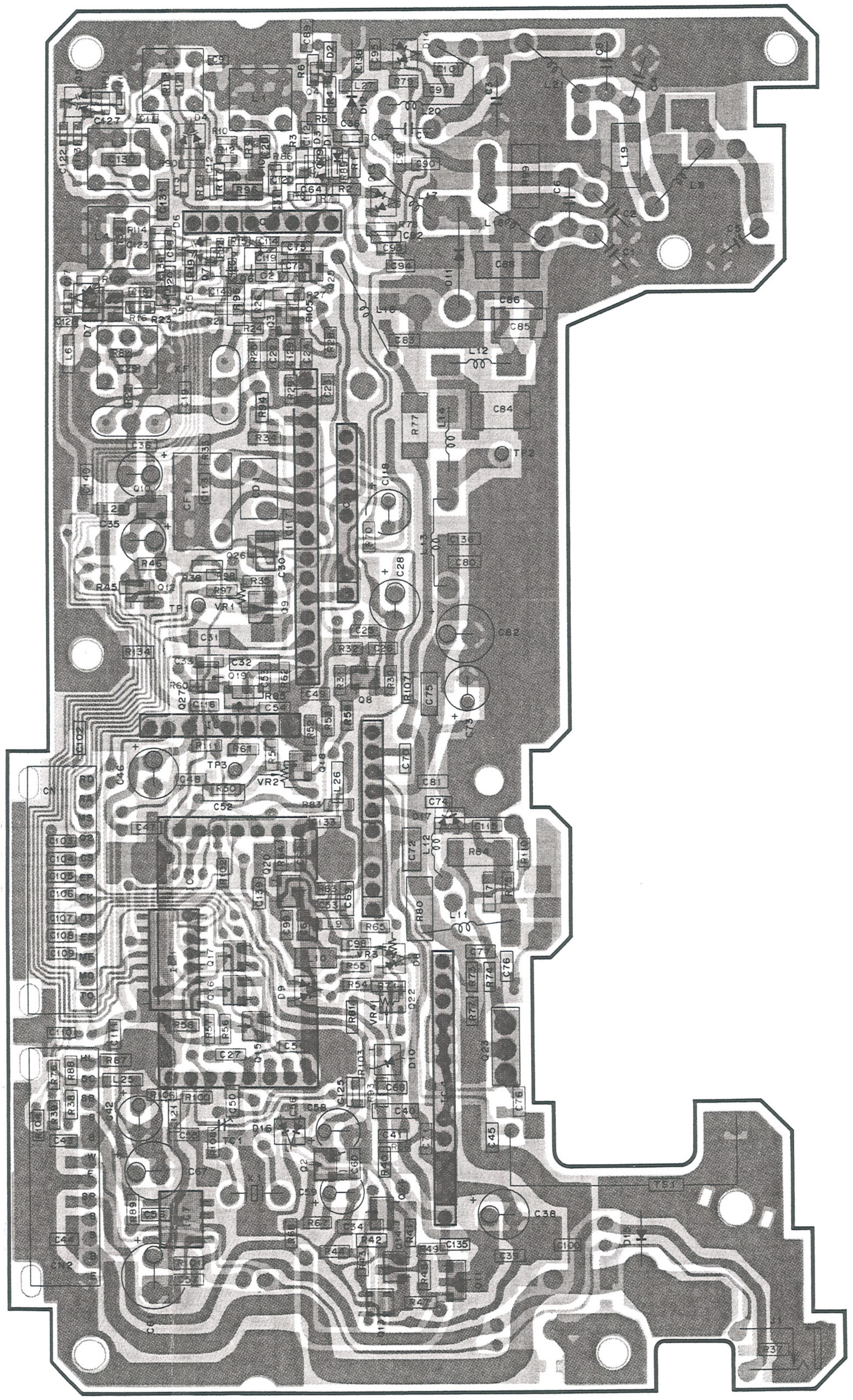


▨ : Component side pattern ▨ : Foil side pattern

50M TX-RX UNIT (X57-3800-01) :UT-50S (M)

Foil side view

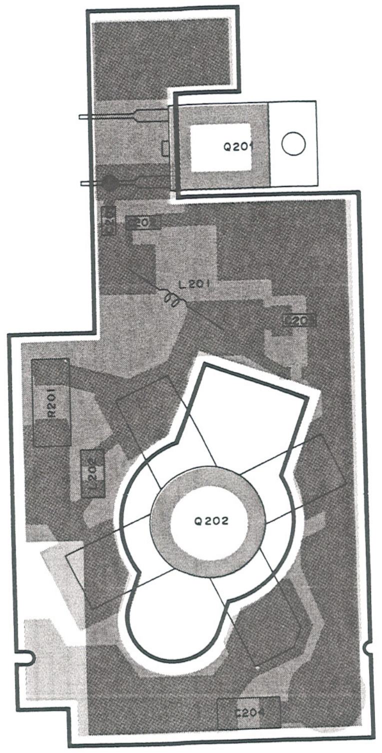
IC1: BU4094BF IC2: KCH10 IC3: KCA04 IC4: KCB18 IC5: KCC04 IC6: KCD04 IC7: LA5010M IC8: KCB19 IC9: KCD05 Q1: 3SK184(S) Q2: 3SK131(V12)
Q3,8,20: 2SC2714(Y) Q4,15~17: DTC144EK Q5: DTC144EU Q6,7, 25: DTA114EK Q9: 2SJ106(GR) Q10: 2SA1362(Y) Q11: 2SB1119S Q12: DTC144WK
Q13: EMW1 Q14,21,24: 2SC2712(Y) Q18: 2SD1757K Q19: 2SK208(Y) Q22: FMG1 Q23: 2SD1902R Q26: DTC143EK D1,2: MA77 D3~6: 1SV228 D7, 9: DAN235(K)
D8,16,17: 1SS184 D10: 1SS181 D11: MI407 D12: MI308 D13,14: 1SS226 D15: DSA3A1



▨ : Component side pattern ▨ : Foil side pattern

SUB UNIT (X58-3840-03)

Component side view

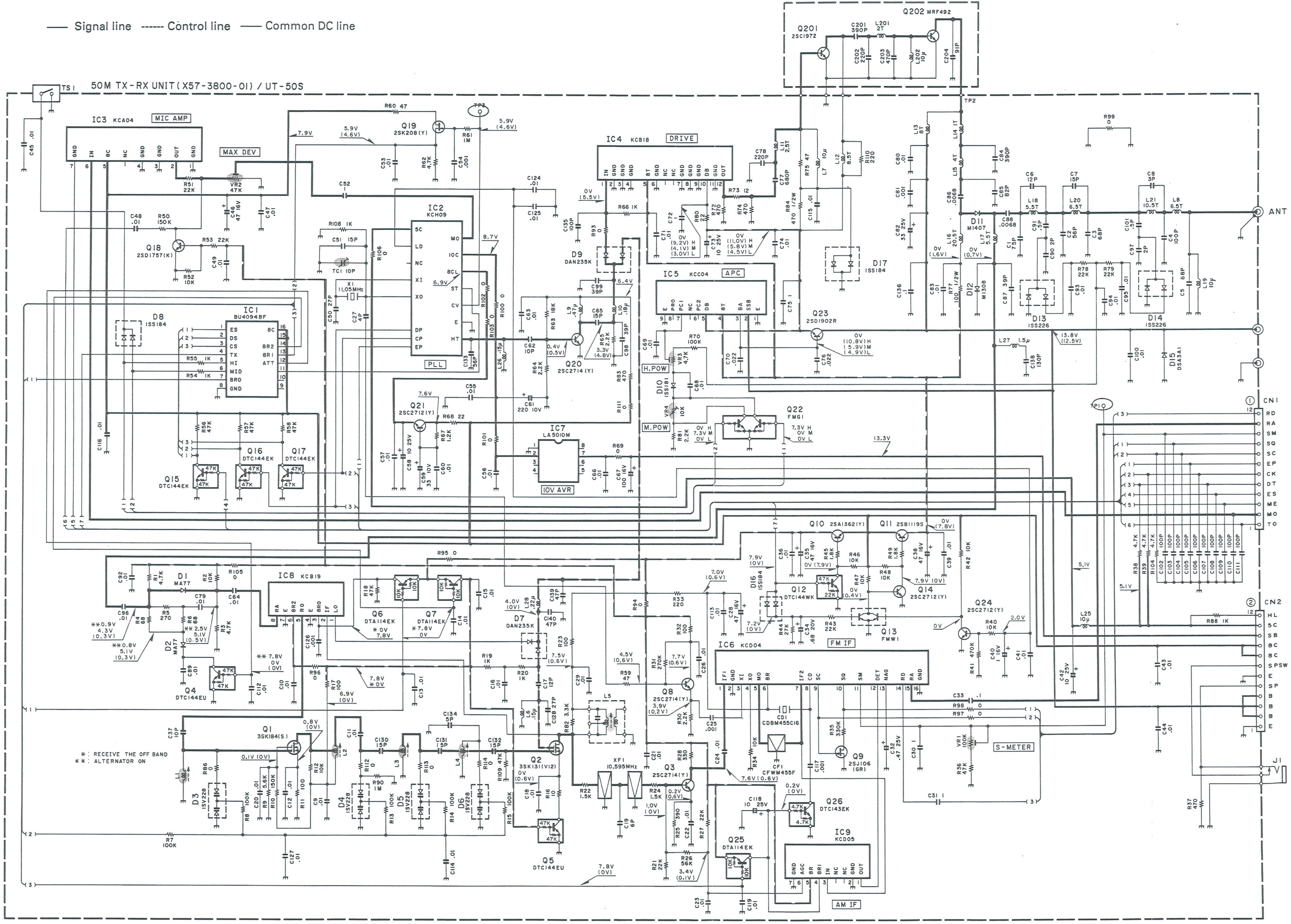


SCHEMATIC DIAGRAM

TM-641A/741A/741E

50M TX-RX UNIT (X57-3800-01): UT-50S(M)

— Signal line ------ Control line —— Common DC line


Z1 (X58-3840-03)
Q201 2SC1972
Q202 MRF492
50M TX-RX UNIT (X57-3800-01) / UT-50S
TS1
IC3 KCA04 MIC AMP
MAX DEV
Q19 2SK208(Y)
IC2 KCH09
IC4 KCB18 DRIVE
IC5 KCC04 APC
D9 DAN235K
Q18 2SD1757(K)
IC1 BU4094BF
D8 1SS184
PLL
Q20 2SC2714(Y)
Q21 2SC2712(Y)
Q23 2SD1902R
D17 1SS184
D11 M1407
D12 M1308
D13 1SS226
D14 1SS226
D15 DSA3A1
D10 1SS181
H.POW
M.POW
Q22 FMG1
IC7 LA5010M
10V AVR
Q15 DTC144EK
Q16 DTC144EK
Q17 DTC144EK
ANT
CN1
RD RA SM SQ SC EP CK DT ES ME MO TO
CN2
HL 5C SB BC BC SPSW E SP B B B E
J1
TP1 TP2 TP3
X1 11.05MHz
D1 MA77
D2 MA77
IC8 KCB19
Q6 DTA114EK
Q7 DTA114EK
D7 DAN235K
Q4 DTC144EU
Q10 2SA1362(Y)
Q11 2SB1119S
Q12 DTC144WK
Q14 2SC2712(Y)
Q13 FMW1
D16 1SS184
FM IF
Q24 2SC2712(Y)
IC6 KCD04
CD1 CDBM455C16
CF1 CFWM455F
Q9 2SJ106 (GR)
S-METER
Q8 2SC2714(Y)
Q1 3SK184(S)
Q2 3SK131(V12)
Q3 2SC2714(Y)
XF1 10.595MHz
L5
D3 1SV228
D4 1SV228
D5 1SV228
D6 1SV228
Q5 DTC144EU
Q25 DTA114EK
Q26 DTC143EK
IC9 KCD05
AM IF
**: RECEIVE THE OFF BAND
*: ALTERNATOR ON

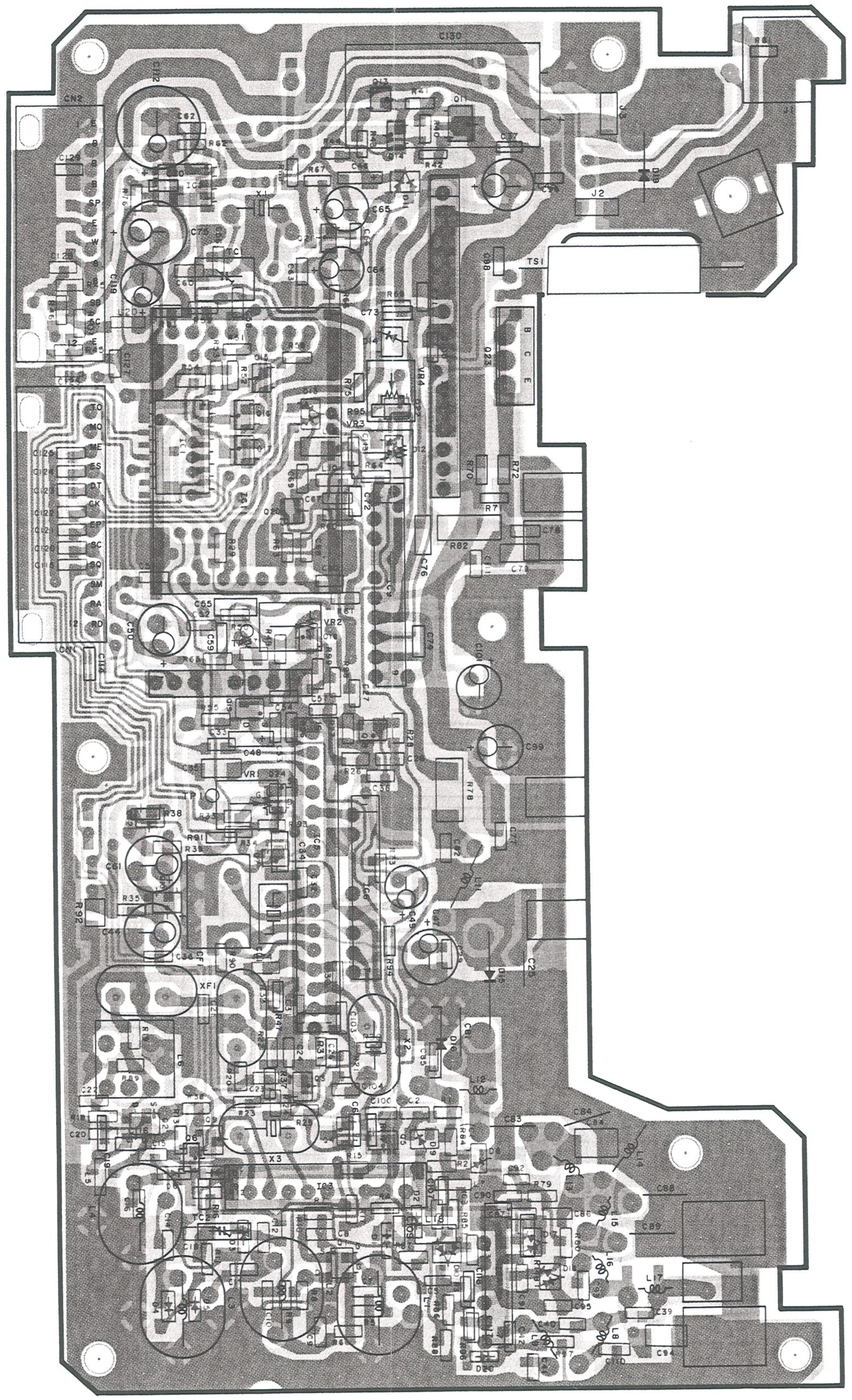
TM-641A/741A/741E

PC BOARD VIEW

144M TX-RX UNIT (X57-3580-12) :641A, 741A, 741E

Component side view

IC1:BU4094BF IC2:LA5010M IC5:KCD04 IC6:KCD05 IC7:KCA04 IC8:KCB11 IC9:KCC04 IC10:S-AV17 IC11:KCH05
Q1:3SK184(S) Q2:3SK131(V12) Q3, 20:2SC2714(Y) Q4:DTA114YK Q5, 6:DTC123JK Q7:DTC143EK Q10:2SA1362(Y) Q11:2SB1119S Q12:DTC144WK
Q13, 14, 21:2SC2712(Y) Q15~17:DTC144EK Q18:2SD1757(K) Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q24:2SJ106(GR)
D1, 3, 4, 6:1SV164 D2, 5, 7:1SV166 D11, 12:1SS184 D13:DAN235(K) D14:1SS181 D15:MI407 D16:MI308 D17, 18:1SS226 D19:DSA3A1

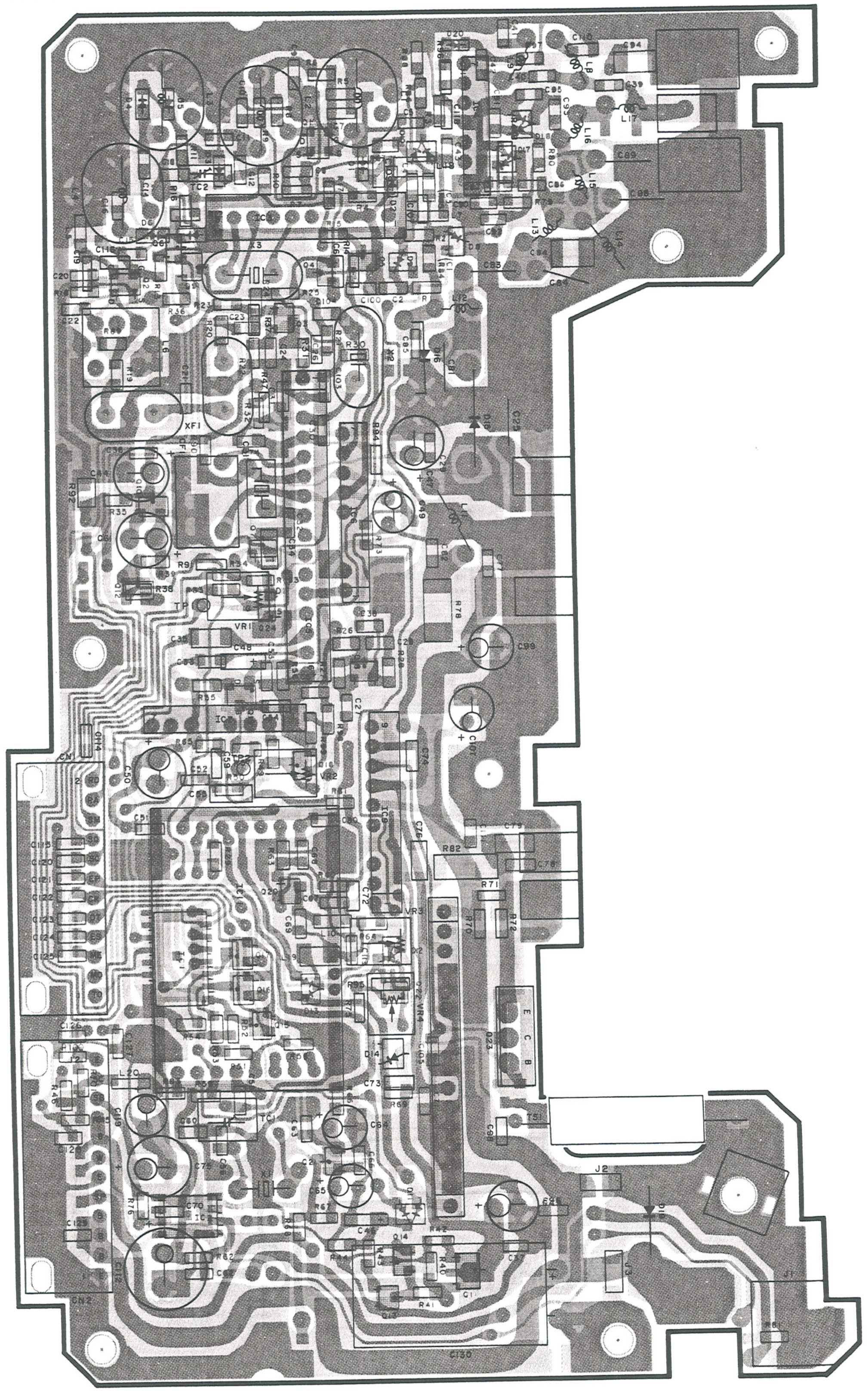


▨ : Component side pattern ▨ : Foil side pattern

144M TX-RX UNIT (X57-3580-12) :641A, 741A, 741E

Foil side view

IC1:BU4094BF IC2:LA5010M IC5:KCD04 IC6:KCD05 IC7:KCA04 IC8:KCB11 IC9:KCC04 IC10:S-AV17 IC11:KCH05
Q1:3SK184(S) Q2:3SK131(V12) Q3, 20:2SC2714(Y) Q4:DTA114YK Q5, 6:DTC123JK Q7:DTC143EK Q10:2SA1362(Y) Q11:2SB1119S Q12:DTC144WK
Q13, 14, 21:2SC2712(Y) Q15~17:DTC144EK Q18:2SD1757(K) Q19:2SK208(Y) Q22:FMG1 Q23:2SD1902R Q24:2SJ106(GR)
D1, 3, 4, 6:1SV164 D2, 5, 7:1SV166 D11, 12:1SS184 D13:DAN235(K) D14:1SS181 D15:MI407 D16:MI308 D17, 18:1SS226 D19:DSA3A1



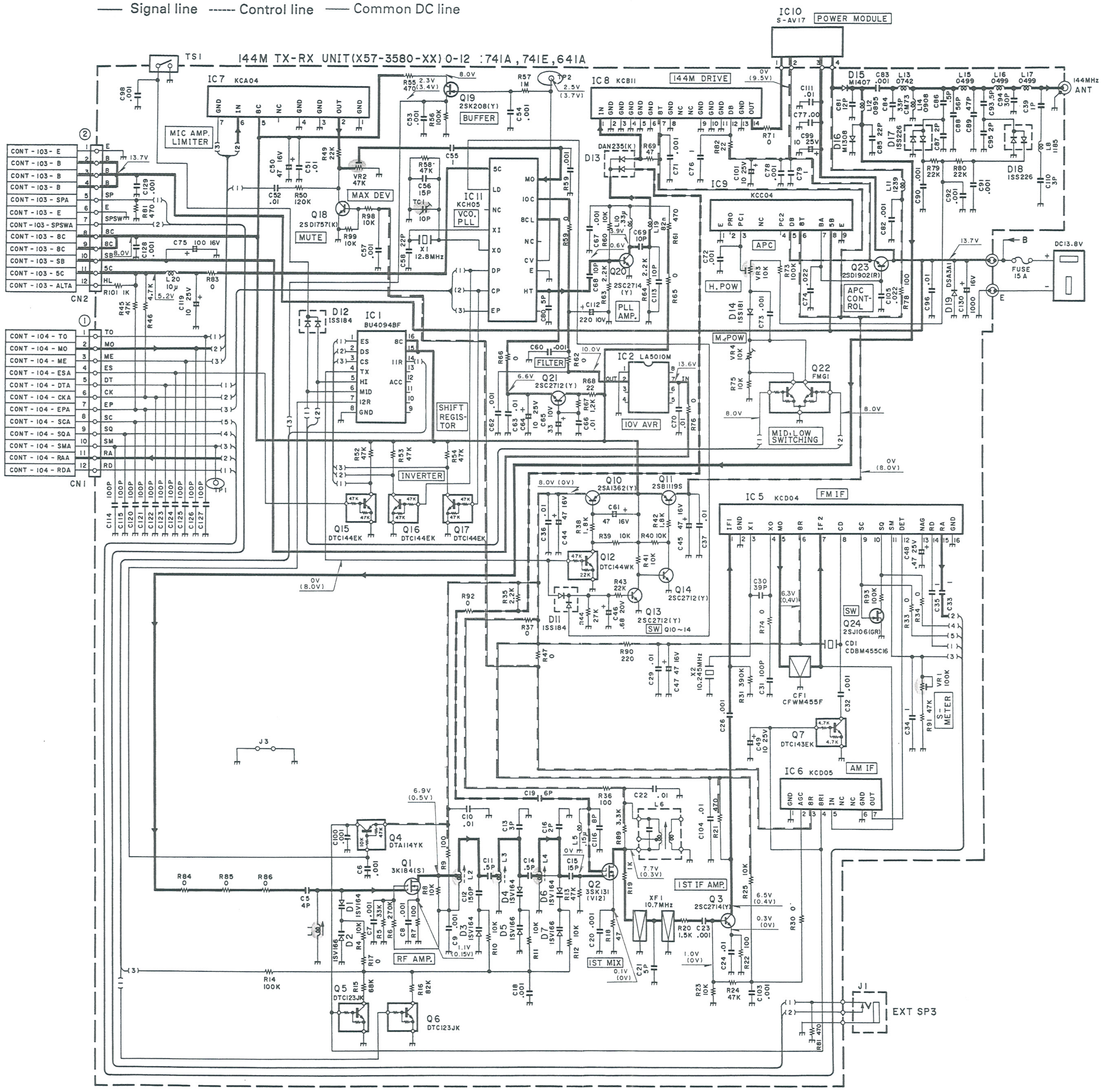
▨ : Component side pattern ▨ : Foil side pattern

TM-641A/741A/741E

SCHEMATIC DIAGRAM

144M TX-RX UNIT (X57-3580-12): 641A, 741A, 741E

—— Signal line ------ Control line —— Common DC line

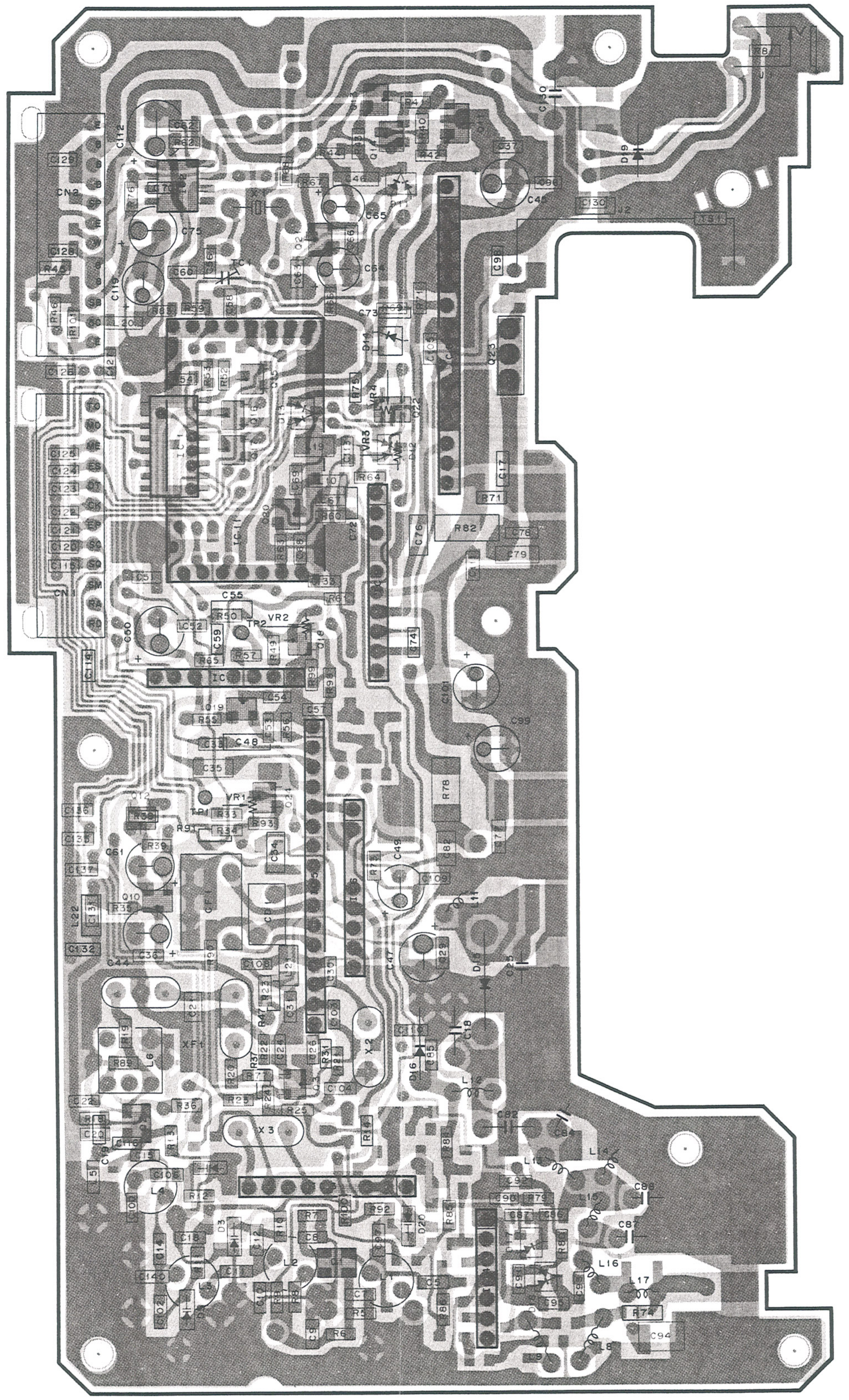

IC10 S-AV17 POWER MODULE
144M TX-RX UNIT (X57-3580-XX) 0-12 :741A, 741E, 641A
TS1
IC7 KCA04
MIC AMP. LIMITER
Q19 2SK208(Y) BUFFER
IC8 KCB11 144M DRIVE
D15 M1407
144MHz ANT
D16 M1408
D17 1SS226
D18 1SS226
D13 DAN235(K)
VR2 47K
MAX DEV
Q18 2SD1757(K) MUTE
IC11 KCH05 VCO, PLL
X1 12.8MHz
Q20 2SC2714 (Y) PLL AMP.
IC9 KCC04 APC
H.POW
Q23 2SD1902(R) APC CONTROL
DC13.8V FUSE 15A
D19 DSA3A1
CN2
CONT-103-E
CONT-103-B
CONT-103-SPA
CONT-103-SPSWA
CONT-103-8C
CONT-103-SB
CONT-103-5C
CONT-103-ALTA
CN1
CONT-104-TO
CONT-104-MO
CONT-104-ME
CONT-104-ESA
CONT-104-DTA
CONT-104-CKA
CONT-104-EPA
CONT-104-SCA
CONT-104-SQA
CONT-104-SMA
CONT-104-RAA
CONT-104-RDA
D12 1SS184
IC1 BU4094BF SHIFT REGISTOR
FILTER
Q21 2SC2712(Y)
IC2 LA5010M 10V AVR
M.POW
Q22 FMG1 MID.LOW SWITCHING
INVERTER
Q15 DTC144EK
Q16 DTC144EK
Q17 DTC144EK
Q10 2SA1362(Y)
Q11 2SB1119S
Q12 DTC144WK
Q13 2SC2712(Y)
Q14 2SC2712(Y)
SW Q10~14
D11 1SS184
IC5 KCD04 FM IF
Q24 2SJ106(GR) SW
CD1 CDBM455C16
CF1 CFWM455F
X2 10.245MHz
VR1 100K S-METER
Q7 DTC143EK
IC6 KCD05 AM IF
J3
Q4 DTA114YK
Q1 3SK184(S) RF AMP.
Q2 3SK131 (V12) 1ST MIX
XF1 10.7MHz
Q3 2SC2714(Y) 1ST IF AMP.
Q5 DTC123JK
Q6 DTC123JK
J1 EXT SP3

PC BOARD VIEW

220M TX-RX UNIT (X57-3810-10) : TM-641A(K), UT -220S(K)

Component side view

IC1: BU4094BF IC2: LA5009M IC5: KCD04 IC7: KCA04 IC8: KCB15 IC9: KCC04 IC10: M57774 IC11: KCH08 Q1,2: 3SK184(S) Q3,20: 2SC2714(Y)
Q10: 2SA1362(Y) Q11: 2SB1119S Q12: DTC144WK Q13,14,21: 2SC2712(Y) Q15~17: DTC144EK Q18: 2SD1757(K) Q19: 2SK208(Y) Q22: FMG1 Q23: 2SD1902R
Q24: 2SJ106(GR) D3,5,7,20: 1SV164 D11,12: 1SS184 D13: DAN235(K) D14: 1SS181 D15: MI407 D16: MI308 D17,18: 1SS226 D19: DSA341

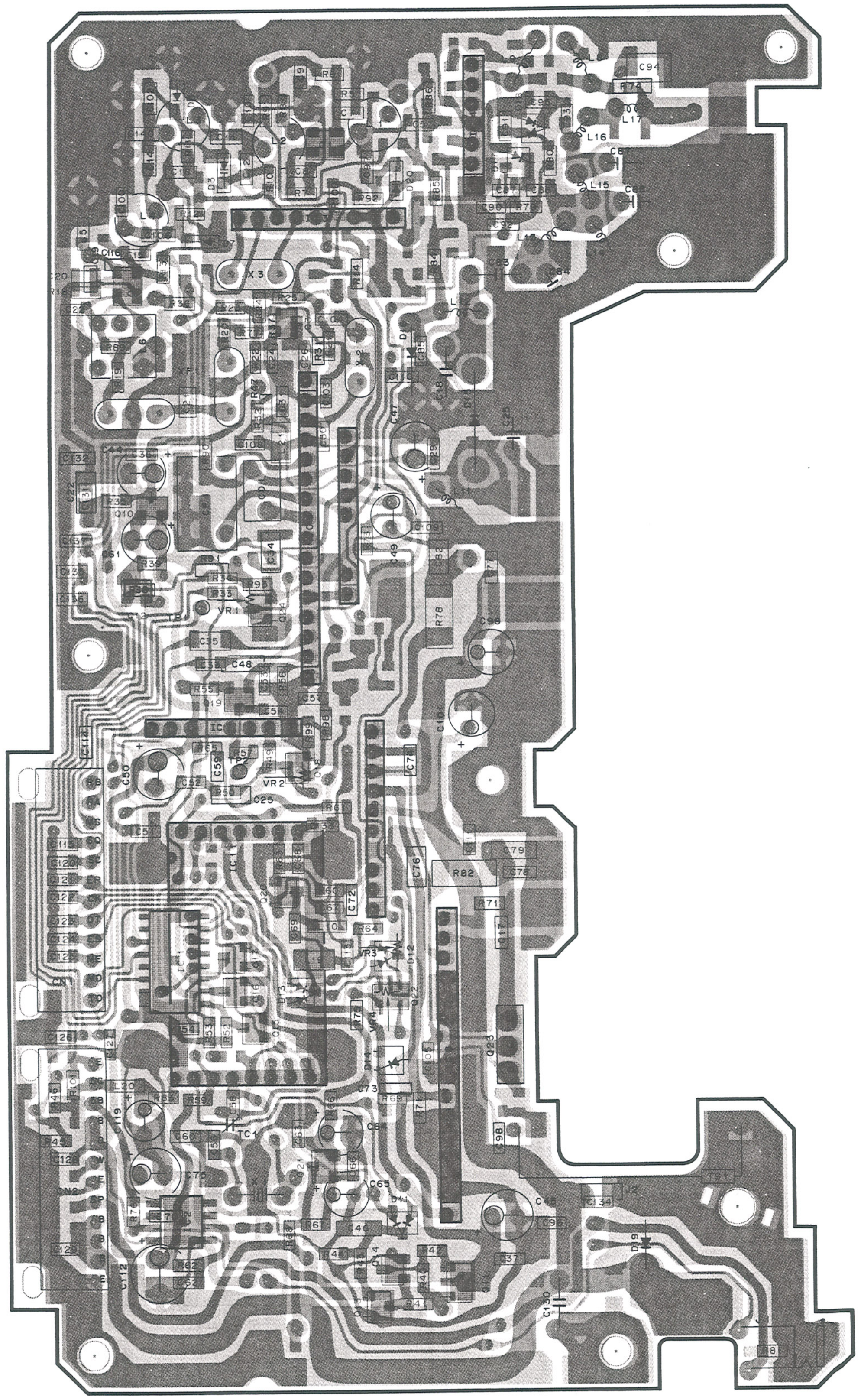


▨ : Component side pattern ■ : Foil side pattern

220M TX-RX UNIT (X57-3810-10) : TM-641A(K), UT -220S(K)

Foil side view

IC1: BU4094BF IC2: LA5009M IC5: KCD04 IC7: KCA04 IC8: KCB15 IC9: KCC04 IC10: M57774 IC11: KCH08 Q1,2: 3SK184(S) Q3,20: 2SC2714(Y)
Q10: 2SA1362(Y) Q11: 2SB1119S Q12: DTC144WK Q13,14,21: 2SC2712(Y) Q15~17: DTC144EK Q18: 2SD1757(K) Q19: 2SK208(Y) Q22: FMG1 Q23: 2SD1902R
Q24: 2SJ106(GR) D3,5,7,20: 1SV164 D11,12: 1SS184 D13: DAN235(K) D14: 1SS181 D15: MI407 D16: MI308 D17,18: 1SS226 D19: DSA341

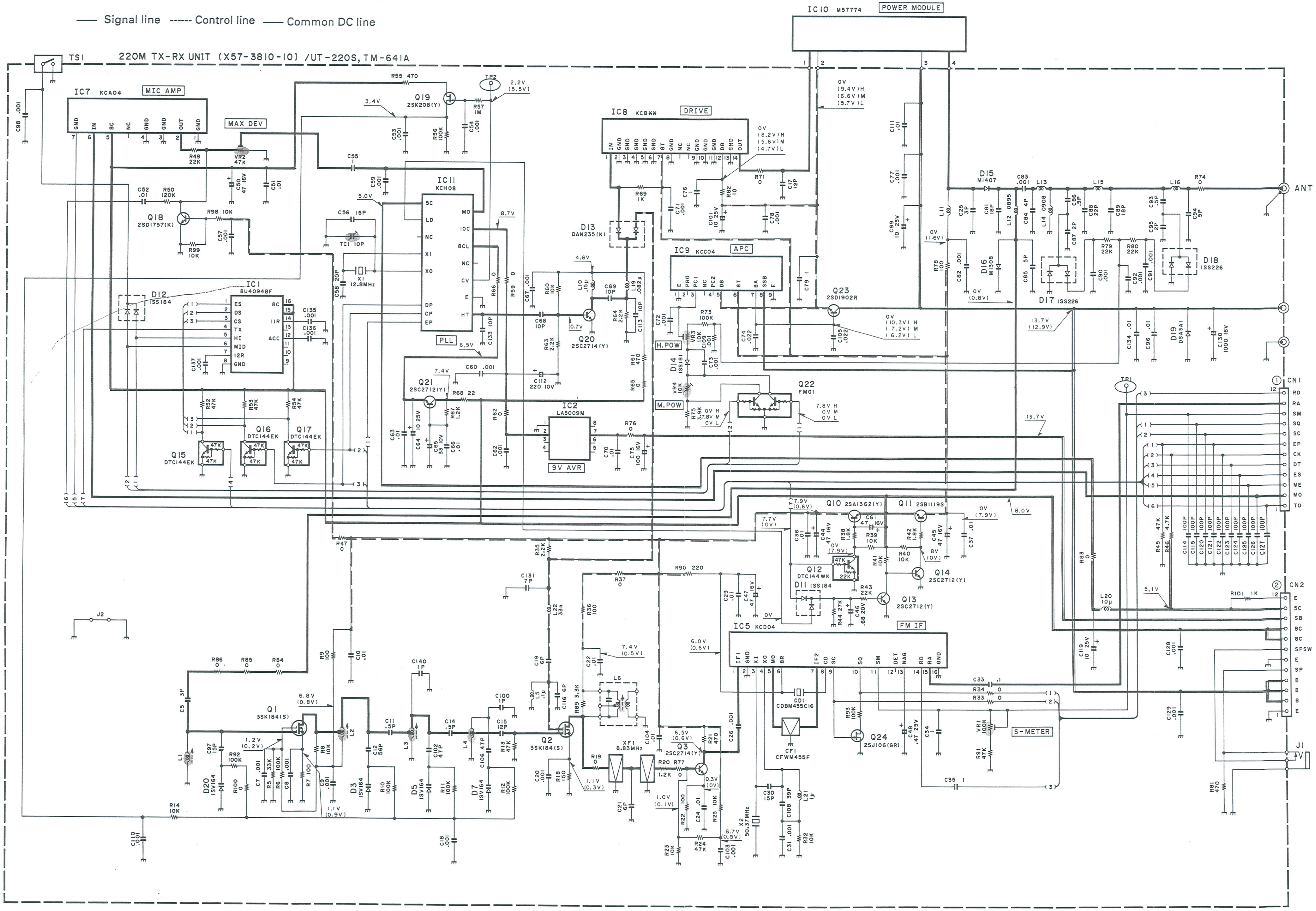


▨ : Component side pattern ■ : Foil side pattern

SCHEMATIC DIAGRAM

220M TX-RX UNIT (X57-3810-10): TM-641A(K), UT-220S(K)

—— Signal line ------ Control line —— Common DC line

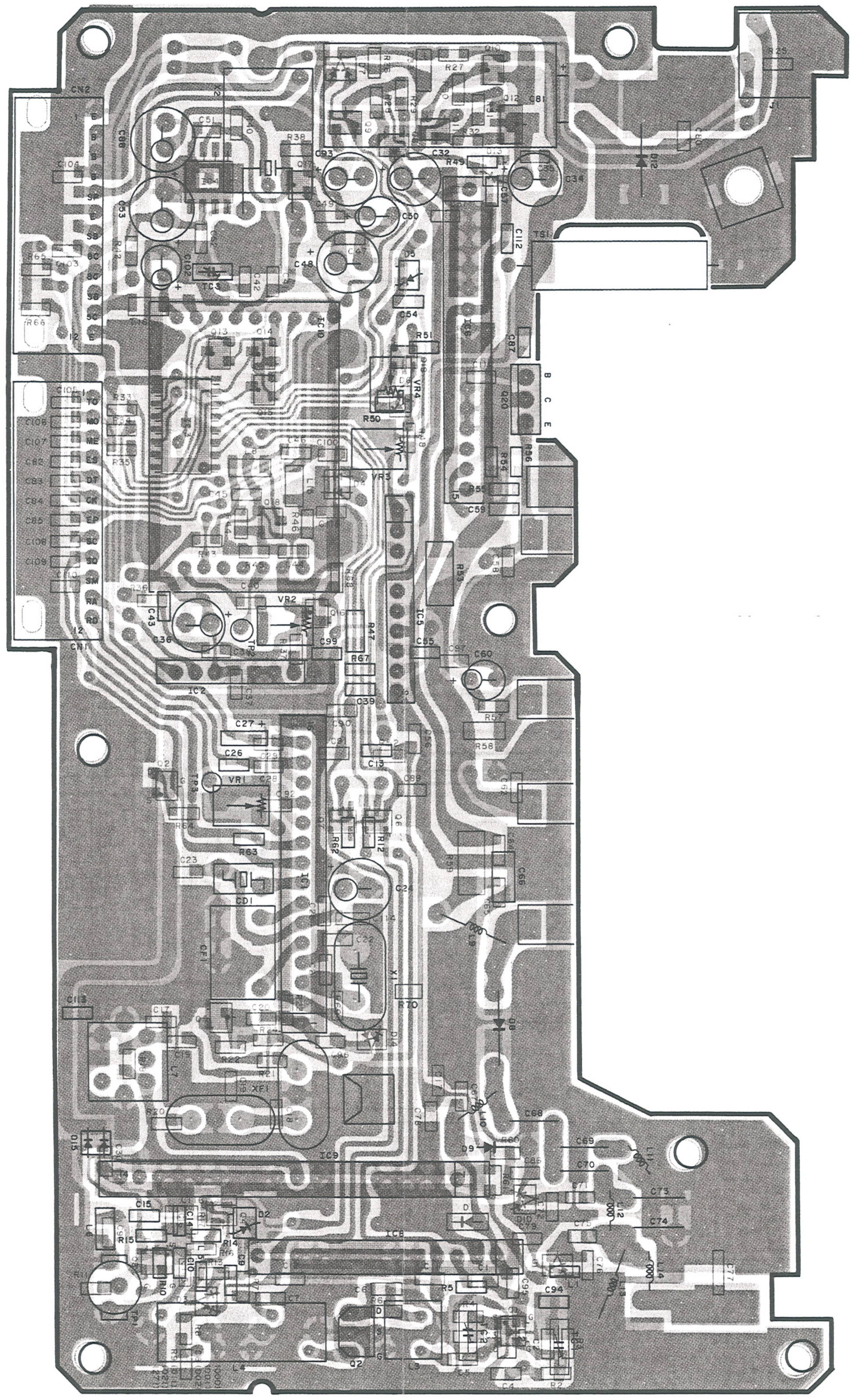

TS1
220M TX-RX UNIT (X57-3810-10) /UT-220S, TM-641A
IC7 KCA04 MIC AMP
MAX DEV
VR2 47K
Q18 2SD1757(K)
Q19 2SK208(Y)
TP2
2.2V (5.5V)
IC11 KCH08
TC1 10P
X1 12.8MHz
PLL
IC1 BU4094BF
D12 1SS184
Q15 DTC144EK
Q16 DTC144EK
Q17 DTC144EK
IC8 KCB** DRIVE
D13 DAN235(K)
Q20 2SC2714(Y)
Q21 2SC2712(Y)
IC2 LA5009M
9V AVR
IC9 KCC04 APC
H.POW
M.POW
D14 1SS181
Q22 FMG1
IC10 M57774 POWER MODULE
Q23 2SD1902R
D15 M1407
D16 M1308
D17 1SS226
D18 1SS226
D19 DSA3A1
ANT
TP1
CN1
RD RA SM SQ SC EP CK DT ES ME MO TO
Q10 2SA1362(Y)
Q11 2SB1119S
Q12 DTC144WK
Q13 2SC2712(Y)
Q14 2SC2712(Y)
D11 1SS184
IC5 KCD04 FM IF
CD1 CDBM455C16
CF1 CFWM455F
Q24 2SJ106(GR)
VR1 100K
S-METER
CN2
E SC SB 8C 8C SPSW E SP B B B E
J1
J2
Q1 3SK184(S)
Q2 3SK184(S)
Q3 2SC2714(Y)
XF1 8.83MHz
X2 50.37MHz
L6
D20 1SV164
D3 1SV164
D5 1SV164
D7 1SV164

TM-641A/741A/741E

PC BOARD VIEW

430/440M TX-RX UNIT (X57-359X-XX) **0-12: 741A (K, P), UT-440S (K),**
Component side view **0-22: 741A (M, M2), 2-72: 741E (E)**

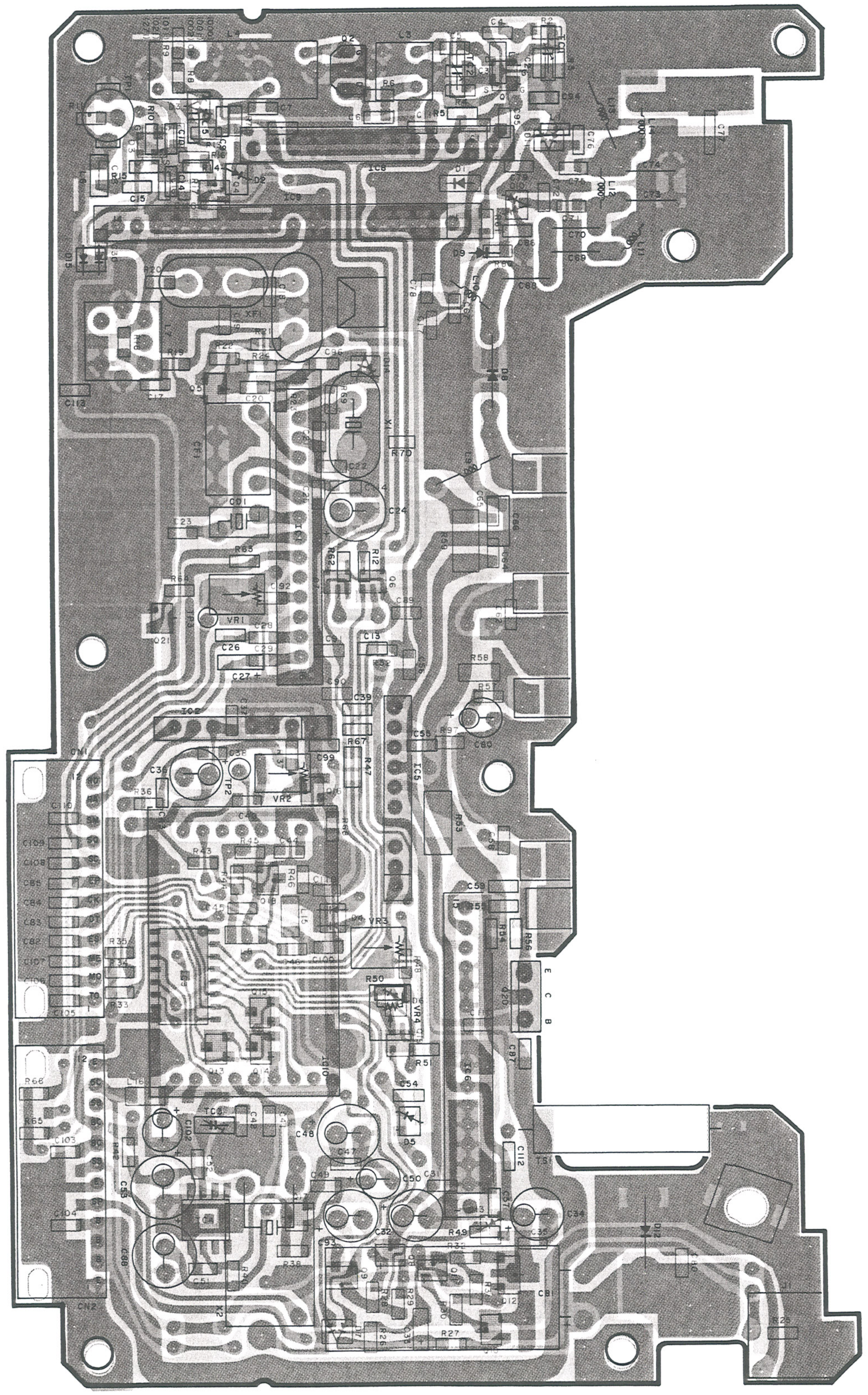
IC1:KCD04 IC2: KCA04 IC3:BU4094BF IC4:LA 5010M IC5:KCC04 IC6:KCB14 IC7:M57788M IC8:KCB12 IC9:KCB13 IC10:KCH07
Q1,3:3SK184(S) Q2:2SK582 Q4: DTC114EK Q5: 2SC2714(Y) Q6,7, FMA5 Q8:2SA1362(Y) Q9; DTC144WK Q10,11,17:2SC2712(Y) Q12:2SB1119S Q13-15:DTC144EK
Q16:2SD1757(K) Q18:2SC3123 Q19:FMG1 Q20:2SD1760(Q) Q21:2SJ106(GR)
D1:HSK277 D2:1SV128 D3:1SS184 D4,15:MA862 D5:1SS181 D6, 7, 13:1SS184 D8:MI407 D9:MI308 D10, 11, 14:MA716 D12:DSA3A1



▨ : Component side pattern ▩ : Foil side pattern

430/440M TX-RX UNIT (X57-359X-XX) **0-12: 741A (K, P), UT-440S (K),**
Foil side view **0-22: 741A (M, M2), 2-72: 741E (E)**

IC1:KCD04 IC2: KCA04 IC3:BU4094BF IC4:LA 5010M IC5:KCC04 IC6:KCB14 IC7:M57788M IC8:KCB12 IC9:KCB13 IC10:KCH07
Q1,3:3SK184(S) Q2:2SK582 Q4: DTC114EK Q5: 2SC2714(Y) Q6,7, FMA5 Q8:2SA1362(Y) Q9; DTC144WK Q10,11,17:2SC2712(Y) Q12:2SB1119S Q13-15:DTC144EK
Q16:2SD1757(K) Q18:2SC3123 Q19:FMG1 Q20:2SD1760(Q) Q21:2SJ106(GR)
D1:HSK277 D2:1SV128 D3:1SS184 D4,15:MA862 D5:1SS181 D6, 7, 13:1SS184 D8:MI407 D9:MI308 D10, 11, 14:MA716 D12:DSA3A1



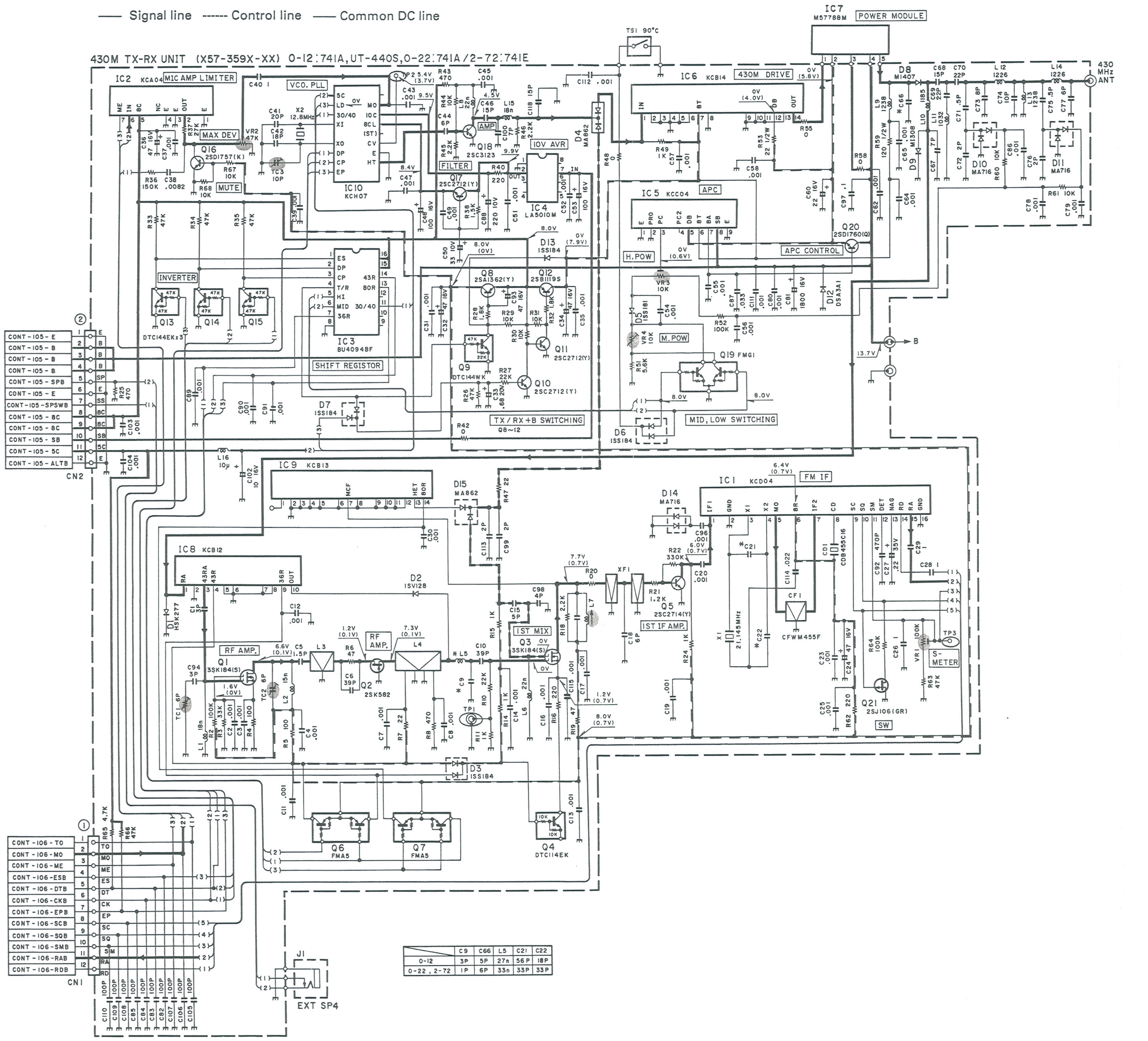
▨ : Component side pattern ▩ : Foil side pattern

TM-641A/741A/741E

SCHEMATIC DIAGRAM

430/440M TX-RX UNIT (X57-359X-XX) 0-12:741A (K, P), UT-440S(K), 0-22:741A (M, M2), 2-72:741E(E)

—— Signal line ------ Control line —— Common DC line


430M TX-RX UNIT (X57-359X-XX) 0-12:741A, UT-440S, 0-22:741A/2-72:741E
IC7 M57788M POWER MODULE
TS1 90°C
IC2 KCA04 MIC AMP LIMITER
MAX DEV
MUTE
Q16 2SD1757(K)
VCO, PLL
IC10 KCH07
X2 12.8MHz
AMP
Q18 2SC3123
FILTER
Q17 2SC2712(Y)
10V AVR
IC4 LA5010M
D4 MA862
IC6 KCB14 430M DRIVE
IC5 KCC04 APC
APC CONTROL
Q20 2SD1760(Q)
H.POW
M.POW
Q19 FMG1
MID, LOW SWITCHING
D6 1SS184
D8 M1407
D9 M1308
D10 MA716
D11 MA716
D12 DSA3A1
430 MHz ANT
INVERTER
Q13 Q14 Q15
DTC144EK×3
IC3 BU4094BF
SHIFT REGISTOR
Q8 2SA1362(Y)
Q12 2SB1119S
Q9 DTC144WK
Q11 2SC2712(Y)
Q10 2SC2712(Y)
TX/RX +B SWITCHING Q8~12
D7 1SS184
D13 1SS184
D5 1SS181
IC9 KCB13
D15 MA862
IC8 KCB12
D1 HSK277
D2 1SV128
RF AMP
Q1 3SK184(S)
Q2 2SK582
L3 L4 L5
TP1
D3 1SS184
1ST MIX
Q3 3SK184(S)
XF1
1ST IF AMP
Q5 2SC2714(Y)
D14 MA716
IC1 KCD04 FM IF
X1 21.145MHz
CF1 CFWM455F
CD1 CDB455C16
Q21 2SJ106(GR)
SW
TP3
S-METER
Q6 FMA5
Q7 FMA5
Q4 DTC114EK
J1 EXT SP4
CN1
CONT-106-TO
CONT-106-MO
CONT-106-ME
CONT-106-ESB
CONT-106-DTB
CONT-106-CKB
CONT-106-EPB
CONT-106-SCB
CONT-106-SQB
CONT-106-SMB
CONT-106-RAB
CONT-106-RDB
CN2
CONT-105-E
CONT-105-B
CONT-105-B
CONT-105-B.
CONT-105-SPB
CONT-105-E
CONT-105-SPSWB
CONT-105-8C
CONT-105-8C
CONT-105-SB
CONT-105-5C
CONT-105-ALTB
13.7V

	C9	C66	L5	C21	C22
0-12	3P	5P	27n	56P	18P
0-22, 2-72	1P	6P	33n	33P	33P

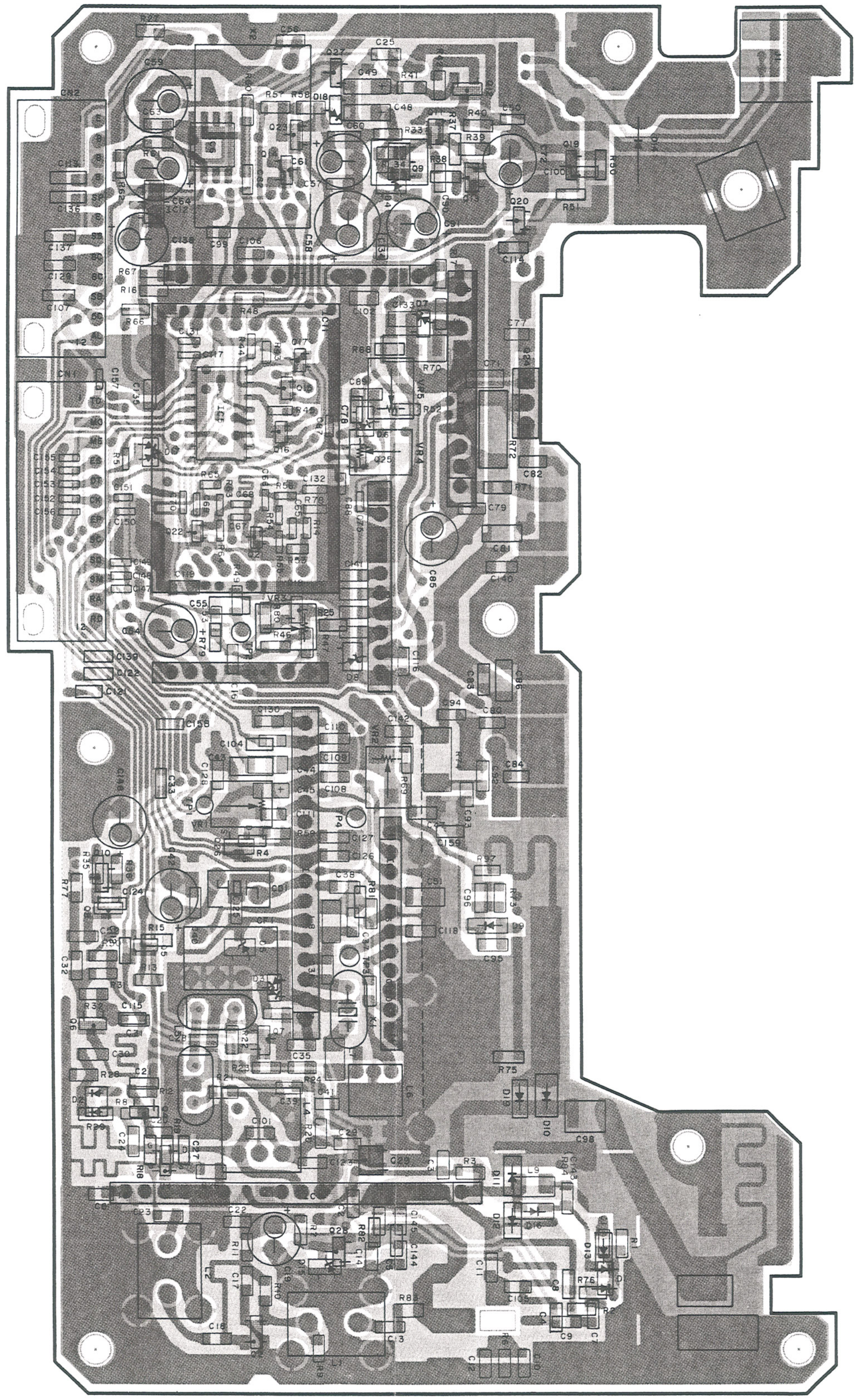
TM-641A/741A/741E

PC BOARD VIEW

1200M TX-RX UNIT (X57-3600-11) :UT-1200 (M)

Component side view

IC2:KCD04 IC3:KCX03 IC4:KCA04 IC5:BU4094BF IC6:LA5009M IC7:KCB09 IC8:KCB10 IC9:KCC04 IC10:M67711 IC11:KCH03 IC12:NUM78L05UA
Q1:MGF1502 Q2:2SC4095(R47,6) Q3:3SK184(S) Q6:2SC3356 Q7:2SC3120 Q8,19:2SA1362(Y) Q9:2SB1302S Q10:DTC144WK
Q11:FMW1 Q12, 13, 23:2SC2712(Y) Q15~17:DTC144EU Q18:2SD1757(K) Q20:STC124EK Q21,22:2SC4226(R23,24)
Q24:2SD1760(Q) Q25:FMG1 Q26:2SJ106(GR) Q28:DTC114EK
D1:MA862 D3:MA716 D4,6:1SS193 D5:02CZ6.2(X, Y) D7,18:1SS187 D8:02CZ12(X, Y) D9:HSK151 D10~13:MI808 D14:DSA3A1 D15:02CZ3.6(Y,Z)
D17:DAP202U D19:MI808

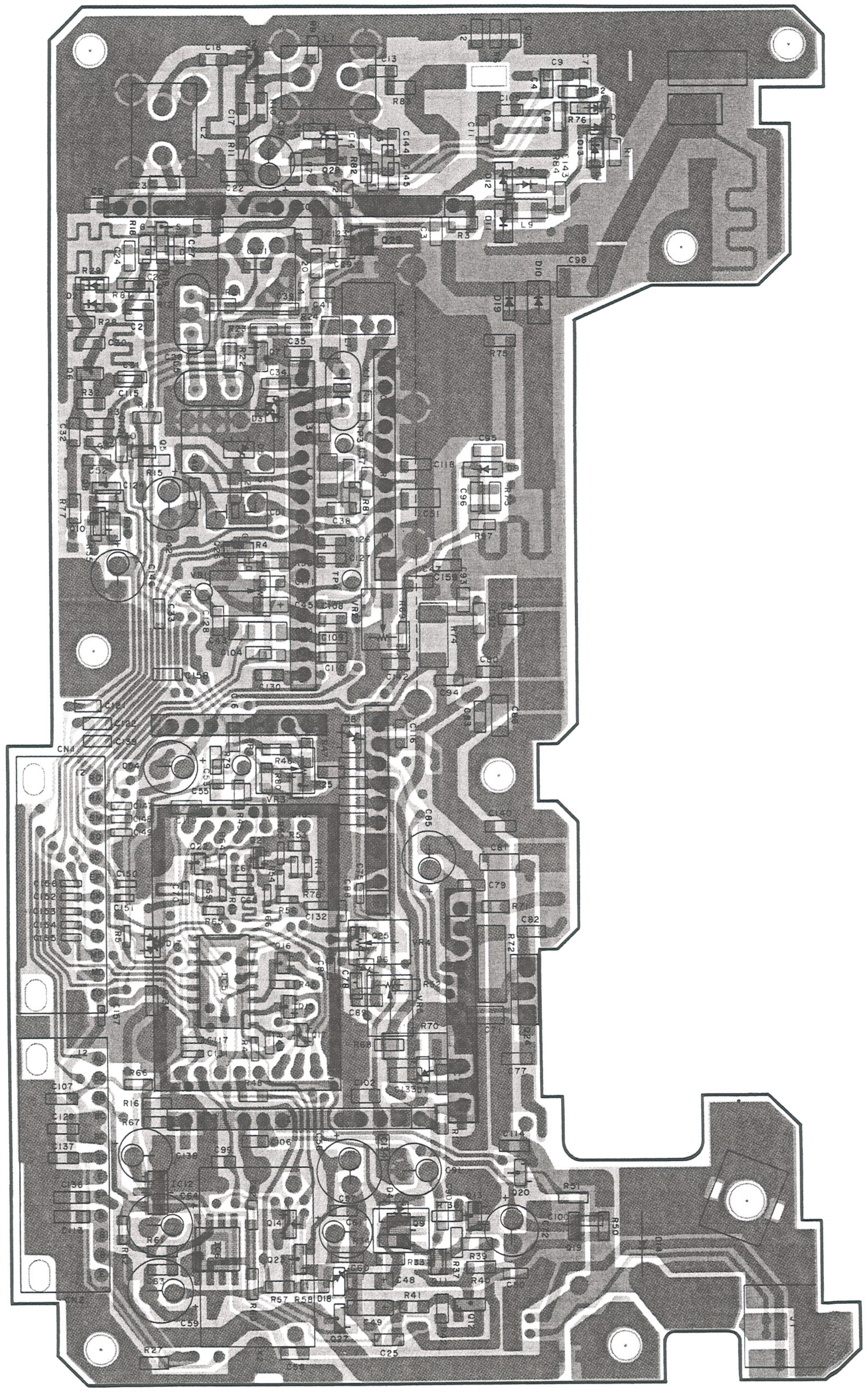


▭ : Component side pattern ▨ : Foil side pattern

1200M TX-RX UNIT (X57-3600-11) :UT-1200 (M)

Foil side view

IC2:KCD04 IC3:KCX03 IC4:KCA04 IC5:BU4094BF IC6:LA5009M IC7:KCB09 IC8:KCB10 IC9:KCC04 IC10:M67711 IC11:KCH03 IC12:NUM78L05UA
Q1:MGF1502 Q2:2SC4095(R47,6) Q3:3SK184(S) Q6:2SC3356 Q7:2SC3120 Q8,19:2SA1362(Y) Q9:2SB1302S Q10:DTC144WK
Q11:FMW1 Q12, 13, 23:2SC2712(Y) Q15~17:DTC144EU Q18:2SD1757(K) Q20:STC124EK Q21,22:2SC4226(R23,24)
Q24:2SD1760(Q) Q25:FMG1 Q26:2SJ106(GR) Q28:DTC114EK
D1:MA862 D3:MA716 D4,6:1SS193 D5:02CZ6.2(X, Y) D7,18:1SS187 D8:02CZ12(X, Y) D9:HSK151 D10~13:MI808 D14:DSA3A1 D15:02CZ3.6(Y,Z)
D17:DAP202U D19:MI808



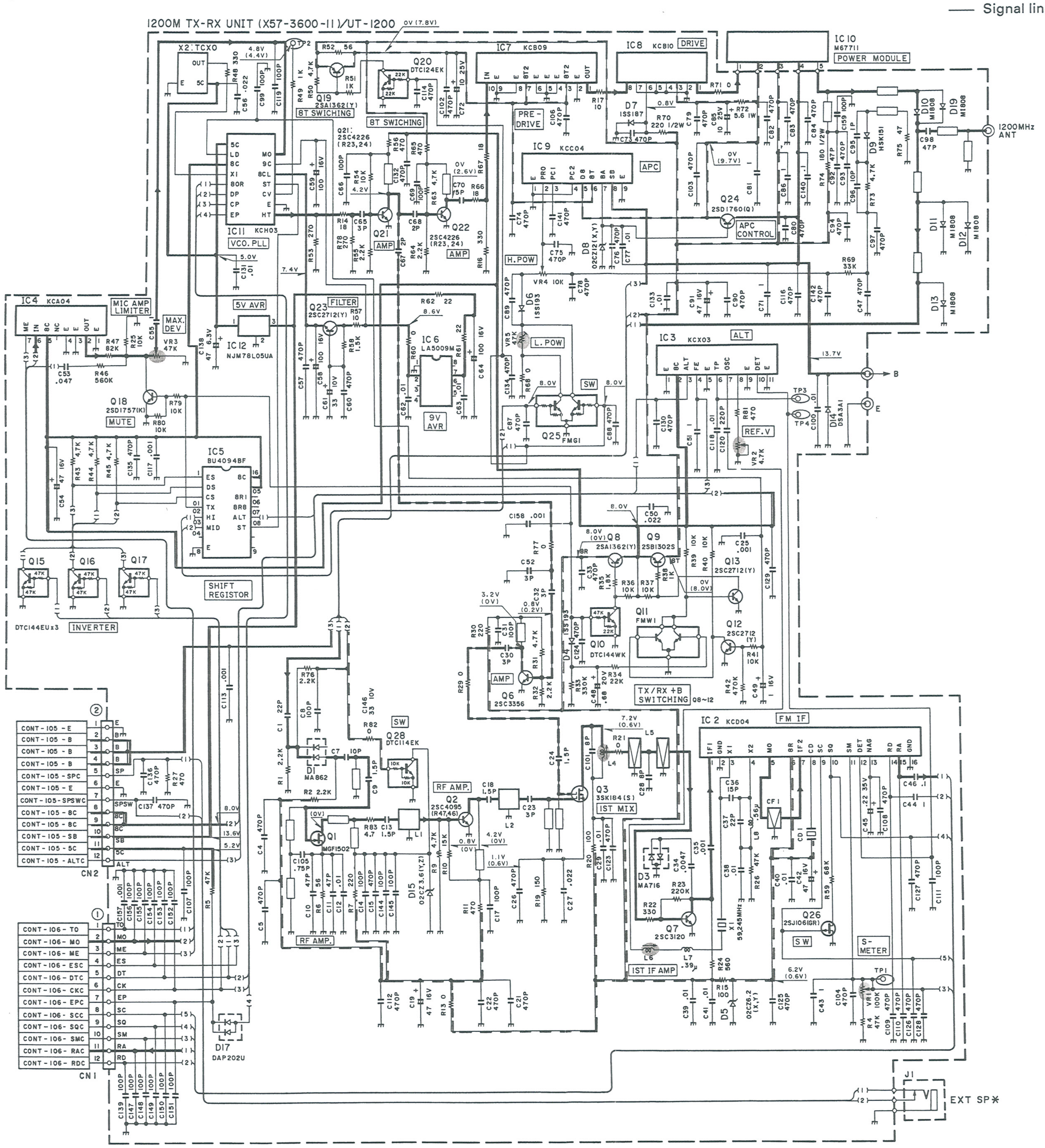
▭ : Component side pattern ▨ : Foil side pattern

TM-641A/741A/741E

SCHEMATIC DIAGRAM

1200M TX-RX UNIT (X57-3600-11): UT-1200(M)

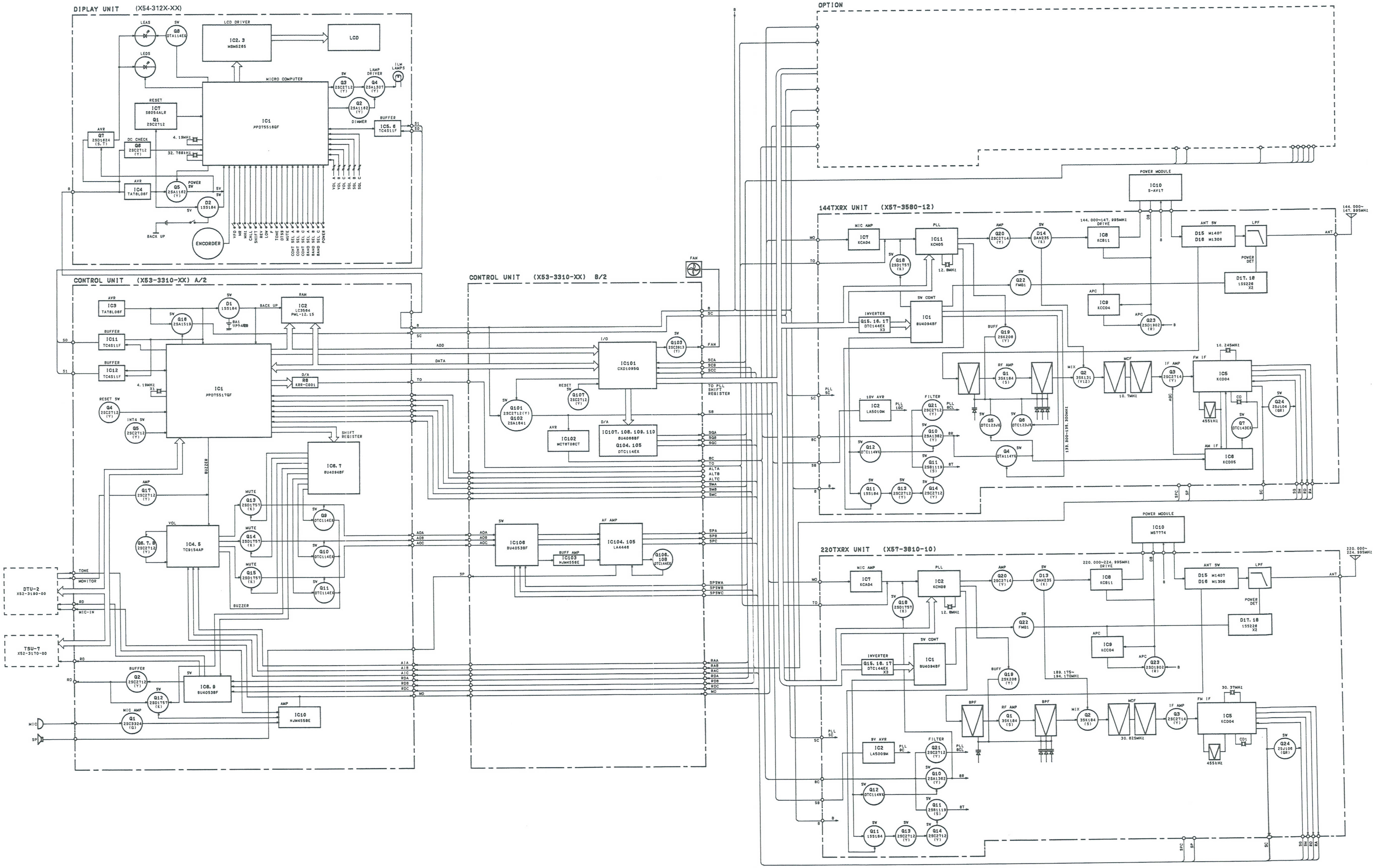
—— Signal line ------ Control line —— Common DC line



1200M TX-RX UNIT (X57-3600-11)/UT-1200
X2:TCXO
IC7 KCB09
IC8 KCB10 DRIVE
IC10 M67711 POWER MODULE
Q20 DTC124EK
Q19 2SA1362(Y) 8T SWICHING
8T SWICHING
PRE-DRIVE
D7 1SS187
IC9 KCC04
APC
Q24 2SD1760(Q) APC CONTROL
D10 M1808
D19 M1808
D9 HSK151
1200MHz ANT
D11 M1808
D12 M1808
D13 M1808
IC11 KCH03 VCO. PLL
Q21 2SC4226 (R23,24)
Q21 AMP
Q22 2SC4226 (R23,24) AMP
H.POW
D8 02CZ12(X,Y)
D6 1SS193
L.POW
VR4 10K
IC4 KCA04
MIC AMP LIMITER
MAX. DEV
5V AVR
IC12 NJM78L05UA
Q23 2SC2712(Y) FILTER
IC6 LA5009M
9V AVR
SW
Q25 FMG1
IC3 KCX03 ALT
REF. V
VR2 4.7K
D14 DSA3A1
TP3
TP4
Q18 2SD1757(K) MUTE
IC5 BU4094BF
Q15
Q16
Q17
DTC144EUx3 INVERTER
SHIFT REGISTOR
Q8 2SA1362(Y)
Q9 2SB1302S
Q13 2SC2712(Y)
Q11 FMW1
Q12 2SC2712 (Y)
Q10 DTC144WK
TX/RX +B SWITCHING Q8~12
Q6 2SC3356 AMP
Q28 DTC114EK
D1 MA862
RF AMP.
Q2 2SC4095 (R47,46)
Q1 MGF1502
D15 02CZ3.6(Y,Z)
RF AMP.
Q3 3SK184(S) 1ST MIX
D3 MA716
Q7 2SC3120
1ST IF AMP
IC2 KCD04 FM IF
CF1
Q26 2SJ106(GR)
SW
S-METER
TP1
D5 02CZ6.2 (X,Y)
59.245MHz
CONT-105-E
CONT-105-B
CONT-105-B
CONT-105-B
CONT-105-SPC
CONT-105-E
CONT-105-SPSWC
CONT-105-8C
CONT-105-8C
CONT-105-SB
CONT-105-5C
CONT-105-ALTC
CN2
CONT-106-TO
CONT-106-MO
CONT-106-ME
CONT-106-ESC
CONT-106-DTC
CONT-106-CKC
CONT-106-EPC
CONT-106-SCC
CONT-106-SQC
CONT-106-SMC
CONT-106-RAC
CONT-106-RDC
CN1
D17 DAP202U
J1
EXT SP✻
13.7V
B
E

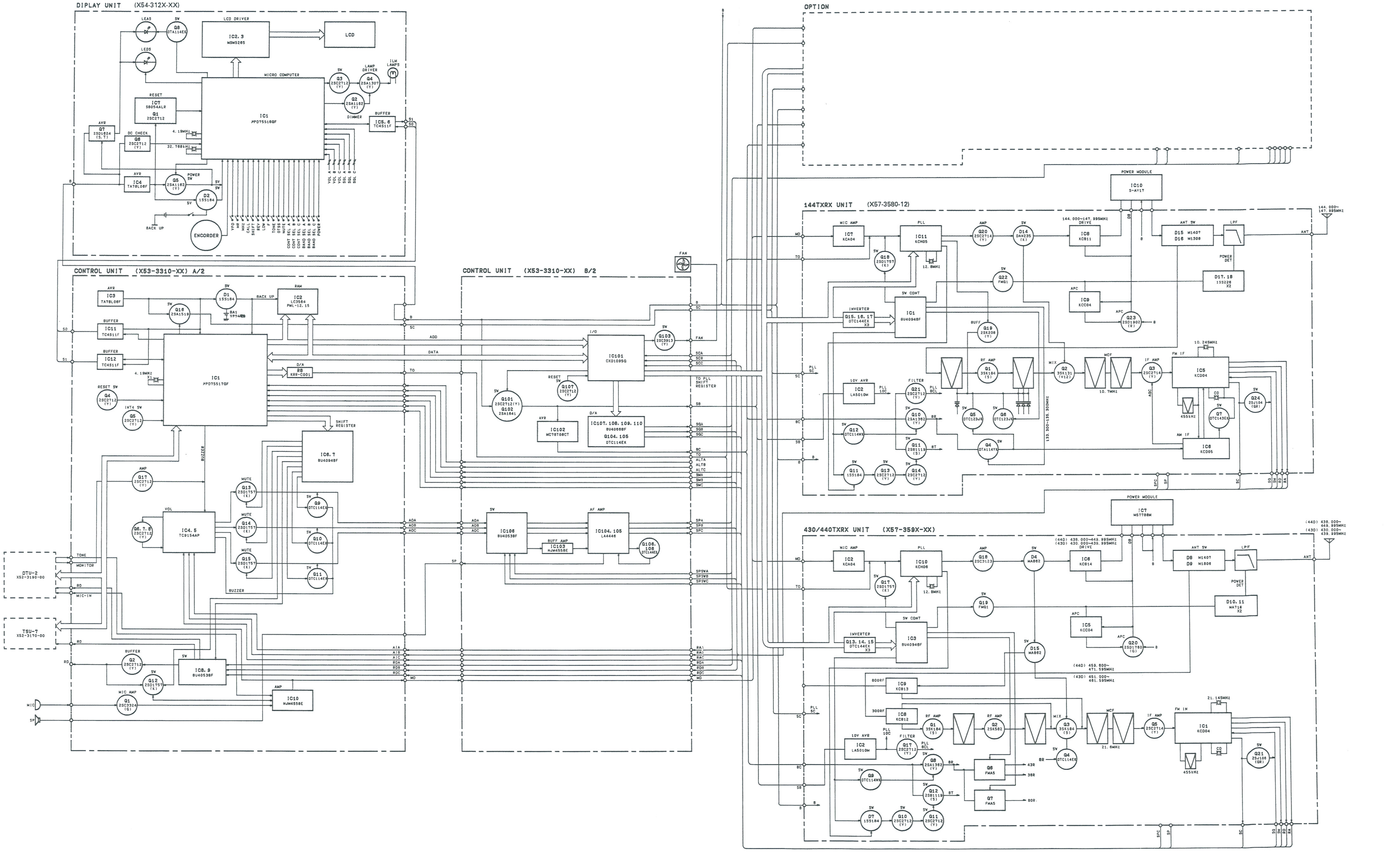
BLOCK DIAGRAM

TM-641A


DIPLAY UNIT (X54-312X-XX)
LEAS
LEDS
SW
Q8
DTA114EK
LCD DRIVER
IC2, 3
MSM5265
LCD
MICRO COMPUTER
IC1
μPD75516GF
RESET
IC7
S8054ALR
Q1
2SC2712
AVR
Q7
2SD1624
(S, T)
DC CHECK
Q6
2SC2712
(Y)
4.19MHz
32.768kHz
IC4
TA78L06F
POWER SW
Q5
2SA1162
(Y)
D2
1SS184
5V
BACK UP
ENCORDER
Q3
2SC2712
(Y)
LAMP DRIVER
Q4
2SA1307
(Y)
ILM LAMPS
Q2
2SA1162
(Y)
DIMMER
BUFFER
IC5, 6
TC4S11F
S1
S0
B
VFO
MR
MHz
CALL
SHIFT
REV
LOW
F
TONE
DTSS
MUTE
CONT SEL A
CONT SEL B
CONT SEL C
BAND SEL A
BAND SEL B
BAND SEL C
POWER
VOL A
VOL B
VOL C
SQL A
SQL B
SQL C
CONTROL UNIT (X53-3310-XX) A/2
AVR
IC3
TA78L06F
SW
Q16
2SA1519
D1
1SS184
BA1
BACK UP
RAM
IC2
LC3564
PML-12.15
BUFFER
IC11
TC4S11F
IC12
TC4S11F
4.19MHz
X1
IC1
μPD75517GF
RESET SW
Q4
2SC2712
(Y)
INT4 SW
Q5
2SC2712
(Y)
D/A
R8
KRR-C001
SHIFT REGISTER
IC6, 7
BU4094BF
BUZZER
AMP
Q17
2SC2712
(Y)
VOL
IC4, 5
TC9154AP
Q6, 7, 8
2SC2712
(Y)
MUTE
Q13
2SD1757
(K)
Q14
2SD1757
(K)
Q15
2SD1757
(K)
Q9
DTC114EK
Q10
DTC114EK
Q11
DTC114EK
BUFFER
Q2
2SC2712
(Y)
Q12
2SD1757
(K)
IC8, 9
BU4053BF
MIC AMP
Q1
2SC3324
(G)
AMP
IC10
NJM4558E
MIC
SP
TONE
MONITOR
RD
MIC-IN
DTU-2
X52-3190-00
TSU-7
X52-3170-00
ADD
DATA
TO
AOA
AOB
AOC
AIA
AIB
AIC
RDA
RDB
RDC
MO
FAN
CONTROL UNIT (X53-3310-XX) B/2
I/O
IC101
CXD1095Q
SW
Q103
2SC3913
(Y)
RESET SW
Q107
2SC2712
(Y)
Q101
2SC2712(Y)
Q102
2SA1641
AVR
IC102
MC78T08CT
D/A
IC107, 108, 109, 110
BU4066BF
Q104, 105
DTC114EK
SW
IC106
BU4053BF
BUFF AMP
IC103
NJM4558E
AF AMP
IC104, 105
LA4446
Q106, 108
DTC144EK
B
SC
SCA
SCB
SCC
TO PLL SHIFT REGISTER
SB
SQA
SQB
SQC
BC
ALTA
ALTB
ALTC
SMA
SMB
SMC
SPA
SPB
SPC
SPSWA
SPSWB
SPSWC
RAA
RAB
RAC
OPTION
POWER MODULE
IC10
S-AV17
144TXRX UNIT (X57-3580-12)
MIC AMP
IC7
KCA04
PLL
IC11
KCH05
12.8MHz
AMP
Q20
2SC2714
(Y)
SW
D14
DAN235
(K)
144.000~147.995MHz
DRIVE
IC8
KC811
ANT SW
D15 M1407
D16 M1308
LPF
ANT
144.000~147.995MHz
POWER DET
D17, 18
1SS226
X2
Q18
2SD1757
(K)
Q22
FMG1
APC
IC9
KCC04
Q23
2SD1902
(R)
SW CONT
IC1
BU4094BF
INVERTER
Q15, 16, 17
DTC144EK
X3
BUFF
Q19
2SK208
(Y)
RF AMP
Q1
3SK184
(S)
MIX
Q2
3SK131
(V12)
MCF
10.7MHz
IF AMP
Q3
2SC2714
(Y)
FM IF
IC5
KCD04
10.245MHz
455kHz
CD
Q24
2SJ104
(GR)
Q7
DTC143EK
AM IF
IC6
KCD05
AGC
133.300~135.300MHz
10V AVR
IC2
LA5010M
PLL 10C
FILTER
Q21
2SC2712
(Y)
PLL 8CL
Q10
2SA1362
(Y)
8R
Q12
DTC114YK
Q11
2SB1119
(S)
8T
Q4
DTA114YK
Q5
DTC123JK
Q6
DTC123JK
Q11
1SS184
Q13
2SC2712
(Y)
Q14
2SC2712
(Y)
PLL 5C
5C
8C
SB
MO
SPC
SP
SQ
SM
RD
RA
DB
POWER MODULE
IC10
M57774
220TXRX UNIT (X57-3810-10)
MIC AMP
IC7
KCA04
PLL
IC2
KCH08
12.8MHz
AMP
Q20
2SC2714
(Y)
SW
D13
DAN235
(K)
220.000~224.995MHz
DRIVE
IC8
KC811
ANT SW
D15 M1407
D16 M1308
LPF
ANT
220.000~224.995MHz
POWER DET
D17, 18
1SS226
X2
Q18
2SD1757
(K)
Q22
FMG1
APC
IC9
KCC04
Q23
2SD1902
(R)
SW CONT
IC1
BU4094BF
INVERTER
Q15, 16, 17
DTC144EK
X3
BUFF
Q19
2SK208
(Y)
189.175~194.170MHz
BPF
RF AMP
Q1
3SK184
(S)
MIX
Q2
3SK184
(S)
MCF
30.825MHz
IF AMP
Q3
2SC2714
(Y)
FM IF
IC5
KCD04
30.375MHz
455kHz
CD1
Q24
2SJ106
(GR)
8V AVR
IC2
LA5009M
PLL 8C
FILTER
Q21
2SC2712
(Y)
PLL 8CL
Q10
2SA1362
(Y)
8R
Q12
DTC114YK
Q11
2SB1119
(S)
8T
Q11
1SS184
Q13
2SC2712
(Y)
Q14
2SC2712
(Y)

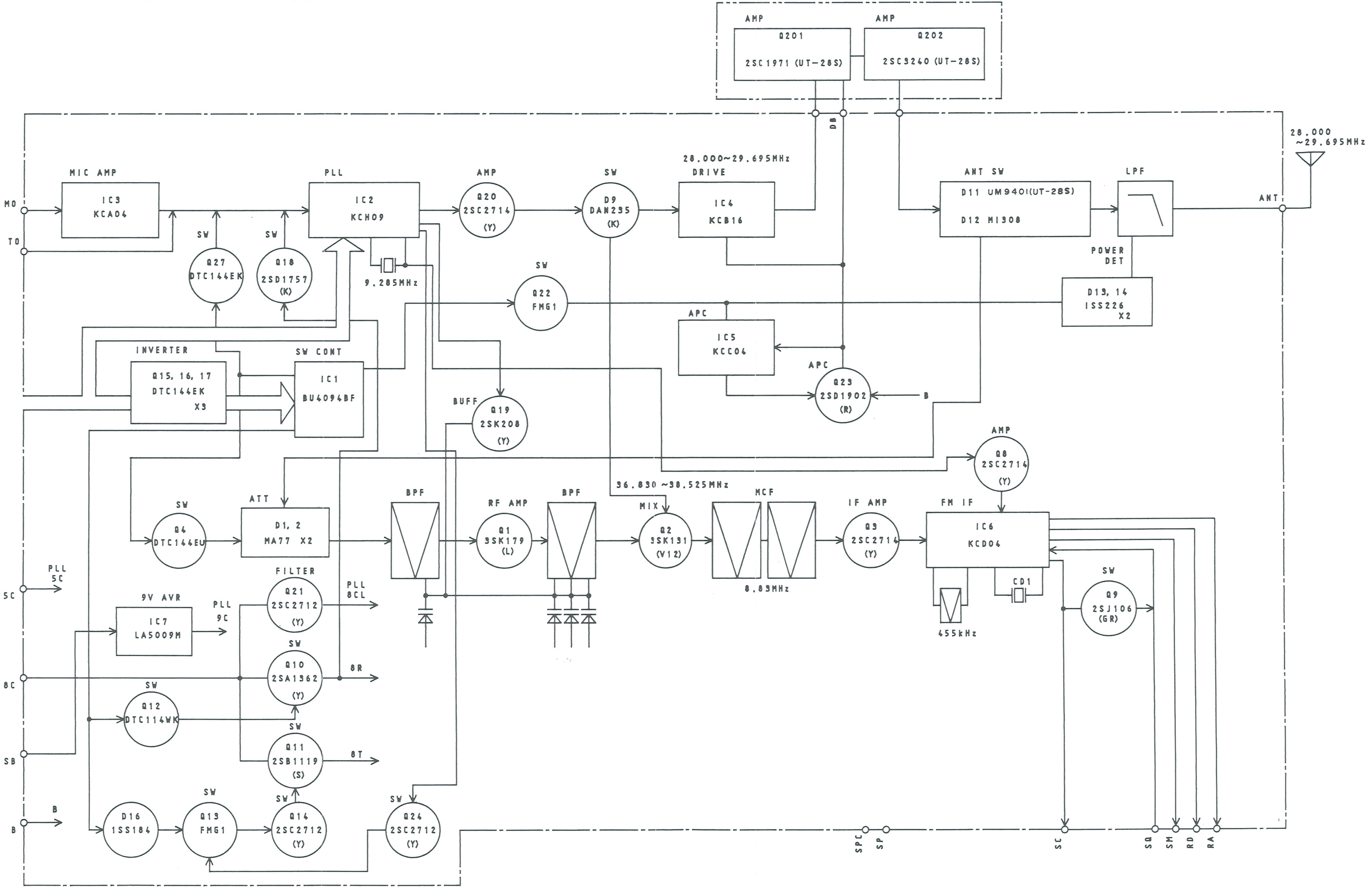
BLOCK DIAGRAM

TM-741A/E


DIPLAY UNIT (X54-312X-XX)
LCD DRIVER
IC2, 3
LCD
MICRO COMPUTER
IC1
RESET
IC7
AVR
Q7
DC CHECK
IC4
POWER SW
ENCORDER
BACK UP
LAMP DRIVER
ILM LAMPS
DIMMER
BUFFER
IC5, 6
CONTROL UNIT (X53-3310-XX) A/2
IC3
RAM
IC2
BUFFER
IC11
IC12
RESET SW
INT4 SW
IC1
D/A
SHIFT REGISTER
IC6, 7
AMP
Q17
VOL
IC4, 5
MUTE
Q13
Q14
Q15
BUZZER
BUFFER
Q2
IC8, 9
MIC AMP
Q1
AMP
IC10
DTU-2
X52-3190-00
TSU-7
X52-3170-00
TONE
MONITOR
RD
MIC-IN
MIC
SP
CONTROL UNIT (X53-3310-XX) B/2
I/O
IC101
Q103
AVR
IC102
D/A
AF AMP
IC104, 105
IC106
BUFF AMP
IC103
FAN
OPTION
144TXRX UNIT (X57-3580-12)
POWER MODULE
IC10
MIC AMP
IC7
PLL
IC11
AMP
Q20
D14
DRIVE
IC8
ANT SW
D15
D16
LPF
POWER DET
D17, 18
APC
IC9
Q23
INVERTER
Q15, 16, 17
SW CONT
IC1
BUFF
Q19
Q22
10V AVR
IC2
FILTER
Q21
RF AMP
Q1
MIX
Q2
MCF
IF AMP
Q3
FM IF
IC5
AM IF
IC6
Q24
430/440TXRX UNIT (X57-359X-XX)
POWER MODULE
IC7
MIC AMP
IC2
PLL
IC10
AMP
Q18
D4
DRIVE
IC6
ANT SW
D8
D9
LPF
POWER DET
D10, 11
APC
IC5
Q20
INVERTER
Q13, 14, 15
SW CONT
IC3
D15
IC9
IC8
10V AVR
IC2
FILTER
Q17
RF AMP
Q1
Q2
MIX
Q3
MCF
IF AMP
Q5
FM IF
IC1
Q21
Q6
Q7
D7
Q10
Q11
ANT

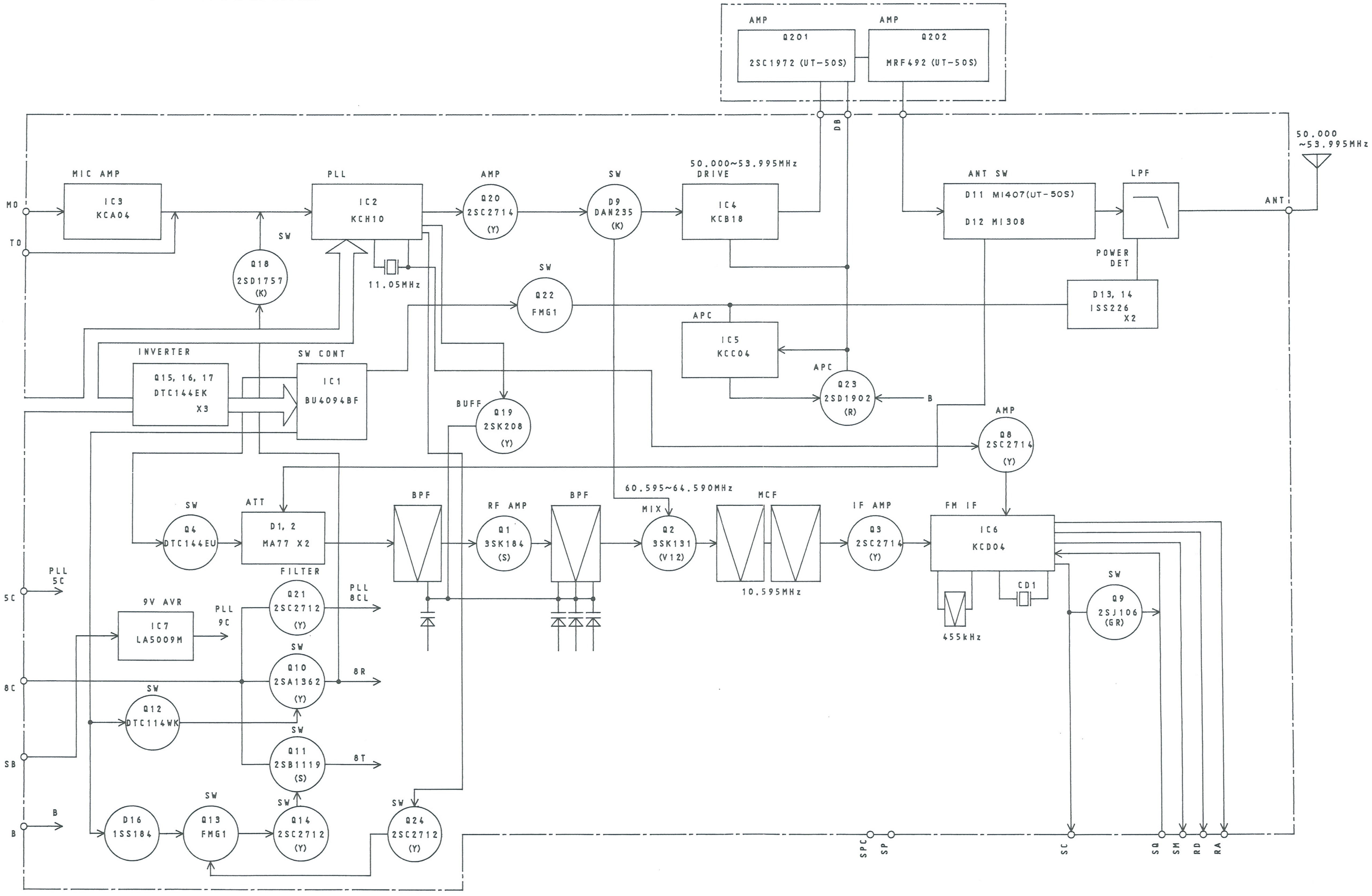
BLOCK DIAGRAM

28M TX-RX UNIT (X57-3790-01): UT-28S(M)


AMP
Q201
2SC1971 (UT-28S)
AMP
Q202
2SC3240 (UT-28S)
DB
28.000~29.695MHz
MIC AMP
IC3
KCA04
MO
TO
PLL
IC2
KCH09
AMP
Q20
2SC2714
(Y)
SW
D9
DAN235
(K)
DRIVE
IC4
KCB16
ANT SW
D11 UM9401(UT-28S)
D12 MI308
LPF
ANT
28.000
~29.695MHz
SW
Q27
DTC144EK
SW
Q18
2SD1757
(K)
9.285MHz
SW
Q22
FMG1
POWER
DET
D13, 14
1SS226
X2
APC
IC5
KCC04
APC
Q23
2SD1902
(R)
B
INVERTER
Q15, 16, 17
DTC144EK
X3
SW CONT
IC1
BU4094BF
BUFF
Q19
2SK208
(Y)
AMP
Q8
2SC2714
(Y)
36.830~38.525MHz
SW
Q4
DTC144EU
ATT
D1, 2
MA77 X2
BPF
RF AMP
Q1
3SK179
(L)
BPF
MIX
Q2
3SK131
(V12)
MCF
8.83MHz
IF AMP
Q3
2SC2714
(Y)
FM IF
IC6
KCD04
CD1
455kHz
SW
Q9
2SJ106
(GR)
PLL
5C
5C
9V AVR
IC7
LA5009M
PLL
9C
FILTER
Q21
2SC2712
(Y)
PLL
8CL
8C
SW
Q10
2SA1362
(Y)
8R
SW
Q12
DTC114WK
SW
Q11
2SB1119
(S)
8T
SB
B
B
D16
1SS184
SW
Q13
FMG1
SW
Q14
2SC2712
(Y)
SW
Q24
2SC2712
(Y)
SPC
SP
SC
SQ
SM
RD
RA

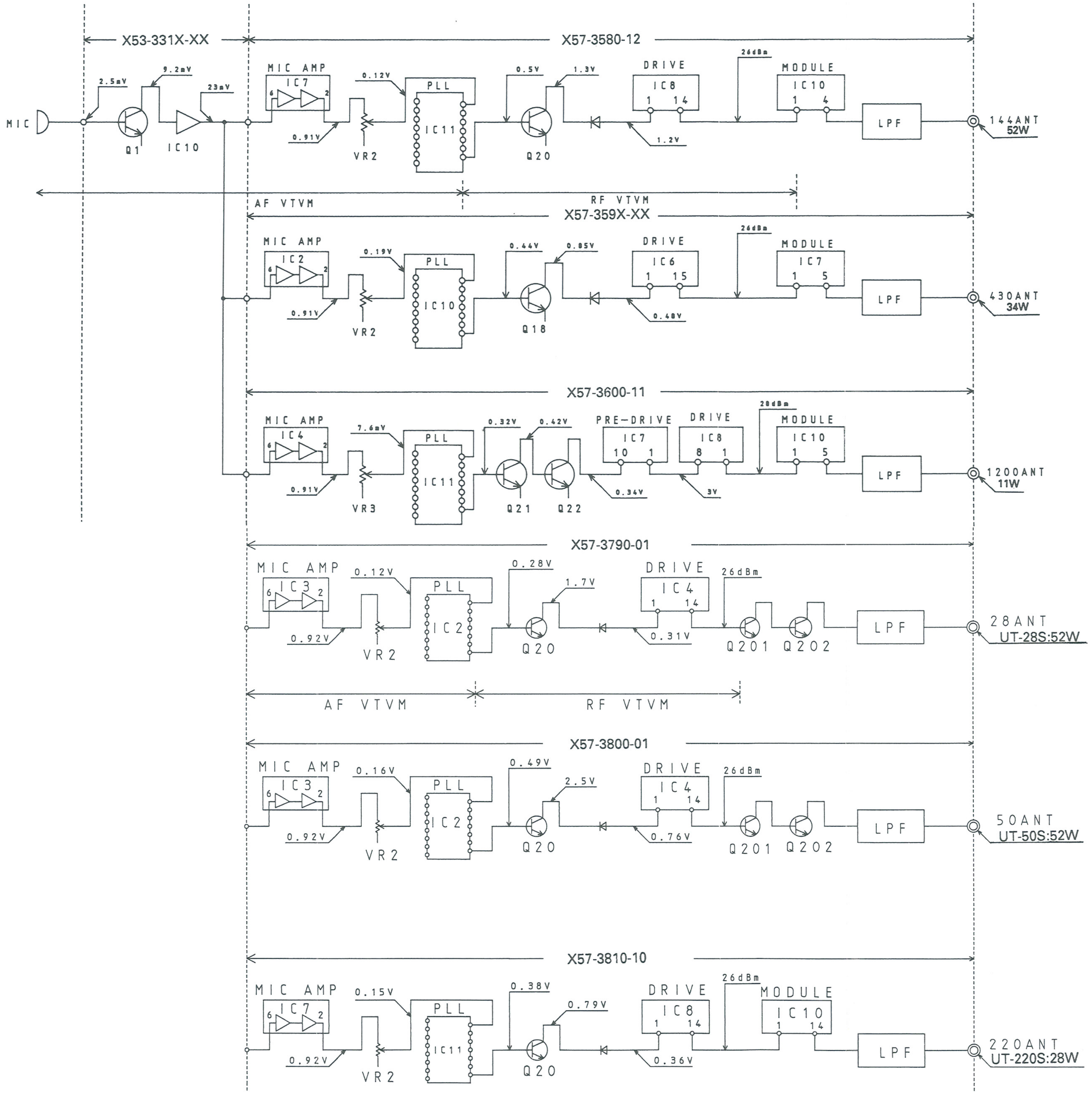
BLOCK DIAGRAM

50M TX-RX UNIT (X57-3800-01): UT-50S(M)


AMP
Q201
2SC1972 (UT-50S)
AMP
Q202
MRF492 (UT-50S)
DB
50.000
~53.995MHz
MIC AMP
IC3
KCA04
MO
TO
PLL
IC2
KCH10
SW
Q18
2SD1757
(K)
11.05MHz
AMP
Q20
2SC2714
(Y)
SW
D9
DAN235
(K)
50.000~53.995MHz
DRIVE
IC4
KCB18
ANT SW
D11 MI407(UT-50S)
D12 MI308
LPF
ANT
POWER
DET
D13, 14
ISS226
X2
SW
Q22
FMG1
APC
IC5
KCC04
APC
Q23
2SD1902
(R)
B
INVERTER
Q15, 16, 17
DTC144EK
X3
SW CONT
IC1
BU4094BF
BUFF
Q19
2SK208
(Y)
AMP
Q8
2SC2714
(Y)
SW
Q4
DTC144EU
ATT
D1, 2
MA77 X2
BPF
RF AMP
Q1
3SK184
(S)
BPF
60.595~64.590MHz
MIX
Q2
3SK131
(V12)
MCF
10.595MHz
IF AMP
Q3
2SC2714
(Y)
FM IF
IC6
KCD04
455kHz
CD1
SW
Q9
2SJ106
(GR)
PLL
5C
5C
9V AVR
IC7
LA5009M
PLL
9C
FILTER
Q21
2SC2712
(Y)
PLL
8CL
SW
Q10
2SA1362
(Y)
8R
8C
SW
Q12
DTC114WK
SW
Q11
2SB1119
(S)
8T
SB
B
B
D16
1SS184
SW
Q13
FMG1
SW
Q14
2SC2712
(Y)
SW
Q24
2SC2712
(Y)
SPC
SP
SC
SQ
SM
RD
RA

LEVEL DIAGRAM

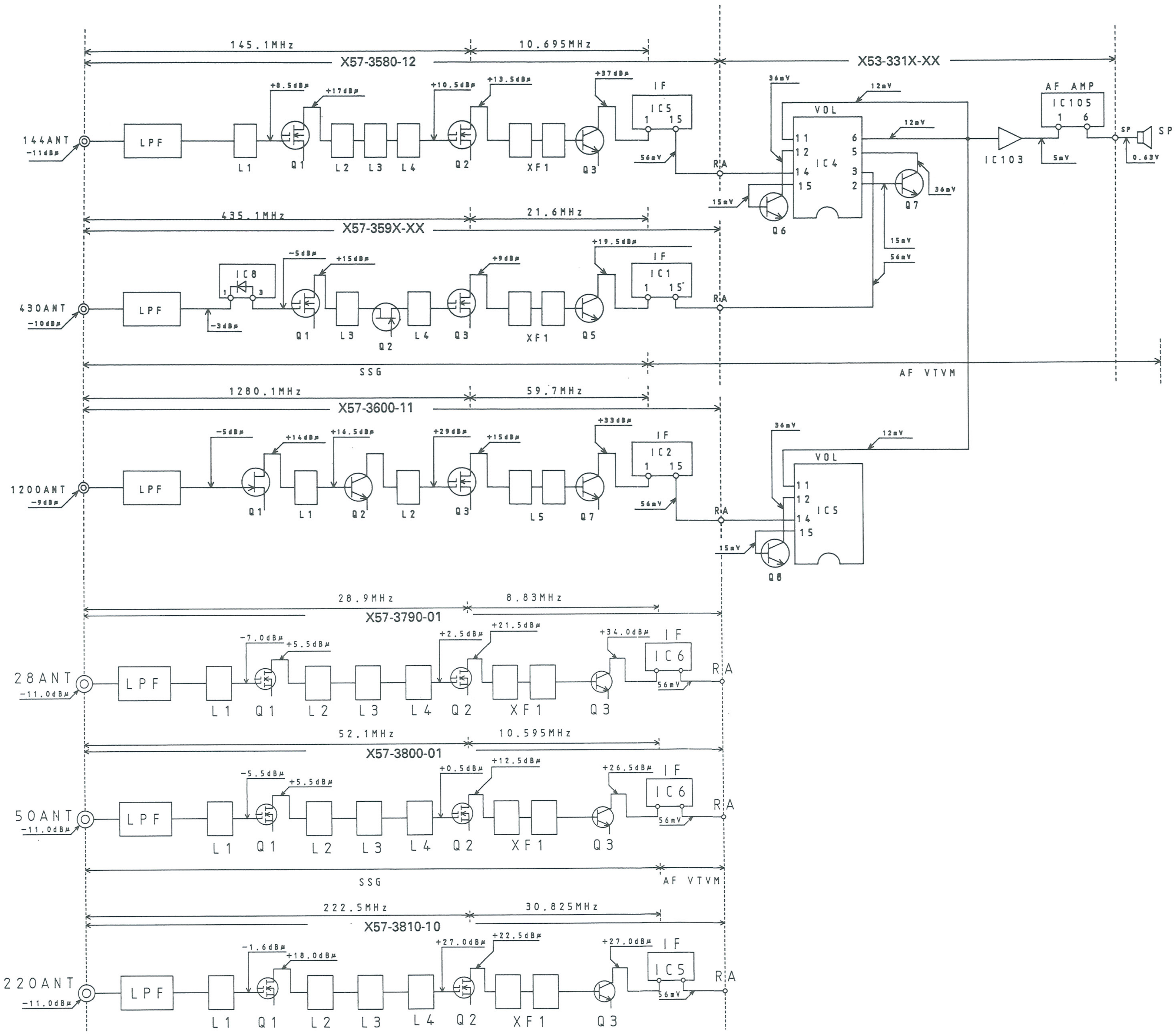
Receiver section


X53-331X-XX
X57-3580-12
MIC
2.5mV
9.2mV
23mV
Q1
IC10
MIC AMP
IC7
0.12V
0.91V
VR2
PLL
IC11
0.5V
1.3V
Q20
DRIVE
IC8
1 14
1.2V
26dBm
MODULE
IC10
1 4
LPF
144ANT
52W
AF VTVM
RF VTVM
X57-359X-XX
MIC AMP
IC2
0.19V
0.91V
VR2
PLL
IC10
0.44V
0.85V
Q18
DRIVE
IC6
1 15
0.48V
26dBm
MODULE
IC7
1 5
LPF
430ANT
34W
X57-3600-11
MIC AMP
IC4
7.6mV
0.91V
VR3
PLL
IC11
0.32V
0.42V
Q21
Q22
PRE-DRIVE
IC7
10 1
0.34V
DRIVE
IC8
8 1
3V
28dBm
MODULE
IC10
1 5
LPF
1200ANT
11W
X57-3790-01
MIC AMP
IC3
0.12V
0.92V
VR2
PLL
IC2
0.28V
1.7V
Q20
DRIVE
IC4
1 14
0.31V
26dBm
Q201
Q202
LPF
28ANT
UT-28S:52W
AF VTVM
RF VTVM
X57-3800-01
MIC AMP
IC3
0.16V
0.92V
VR2
PLL
IC2
0.49V
2.5V
Q20
DRIVE
IC4
1 14
0.76V
26dBm
Q201
Q202
LPF
50ANT
UT-50S:52W
X57-3810-10
MIC AMP
IC7
0.15V
0.92V
VR2
PLL
IC11
0.38V
0.79V
Q20
DRIVE
IC8
1 14
0.36V
26dBm
MODULE
IC10
1 14
LPF
220ANT
UT-220S:28W

1. SG input level for which a 12dB SINAD are obtained. Measured by connecting the SG to each point via a 0.01µF capacitor.
2. AF level obtained when the AF output level is adjusted for 0.63V/8Ω with the front panel AF VOL control. Measure with AF voltmeter connected to the speaker jack, receiving a 40dB EMF SSG signal modulated at 1KHz, DEV 3KHz.

LEVEL DIAGRAM

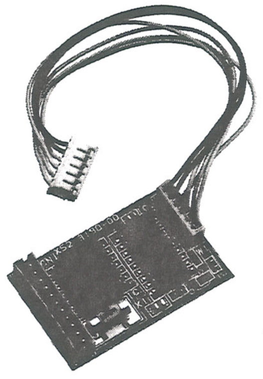
Transmitter section


145.1MHz
10.695MHz
X57-3580-12
X53-331X-XX
144ANT
-11dBμ
LPF
L1
Q1
L2
L3
L4
Q2
XF1
Q3
IF
IC5
VOL
IC4
Q6
Q7
AF AMP
IC105
IC103
SP
0.63V
435.1MHz
21.6MHz
X57-359X-XX
430ANT
-10dBμ
IC8
Q5
IC1
SSG
AF VTVM
1280.1MHz
59.7MHz
X57-3600-11
1200ANT
-9dBμ
IC2
L5
Q7
IC5
Q8
28.9MHz
8.83MHz
X57-3790-01
28ANT
-11.0dBμ
IC6
RA
52.1MHz
10.595MHz
X57-3800-01
50ANT
-11.0dBμ
222.5MHz
30.825MHz
X57-3810-10
220ANT
-11.0dBμ
56mV
15mV
36mV
12mV
5mV

1. AG is set so taht MIC input becomes 3kHz DEV at 1kHz MOD.
2. Transmitting frequency; 145.0MHz, 435.0MHz, 1280MHz, 28.0MHz, 50.0MHz, 220.0MHz.
3. HI/MID/LOW SW: HI
4. APC SW: OFF

DTU-2 (DTMF UNIT)

DTU-2 EXTERNAL VIEW



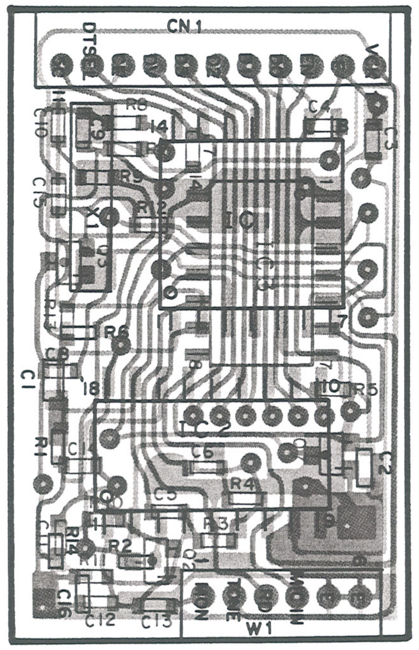
DTU-2 PARTS LIST

* NEW PARTS

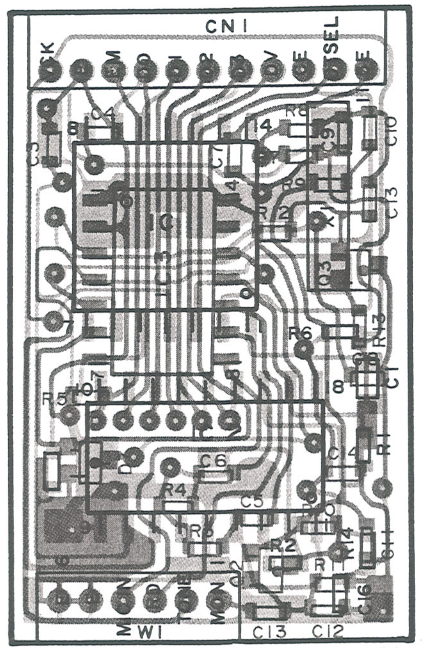
Ref. No.	New parts	Parts No.	Description
C1		CK73FB1E104K	Chip C 0.1µF K
C2		CC73GCH1H100D	Chip C 10pF D
C3, 4		CC73GCH1H330J	Chip C 33pF J
C5~8, 10		CK73GB1E103K	Chip C 0.01µF K
C13~16		CK73GB1E103K	Chip C 0.01µF K
C9		CK73GB1E822K	Chip C 0.0082µF K
C10		CK73GB1E322K	Chip C 0.0033µF K
C11		CC73GSL1H101J	Chip C 100pF J
		E37-0033-05	Connecting cable (6P)
		E40-5188-05	Pin ass'y socket (11P)
X1		L78-0061-05	CERAMIC RESONATOR (3.58MHz)
R1~14		RK73GB1JxxxJ	Chip R
Q1		DTC114EU	Digital transistor
Q2, 3		2SC4116 (Y)	Digital transistor
IC1		TP5088WM	IC
IC2		LC7385M	IC
IC3		BU4066BF	IC

DTU-2 PC BOARD VIEWS

Componet side view

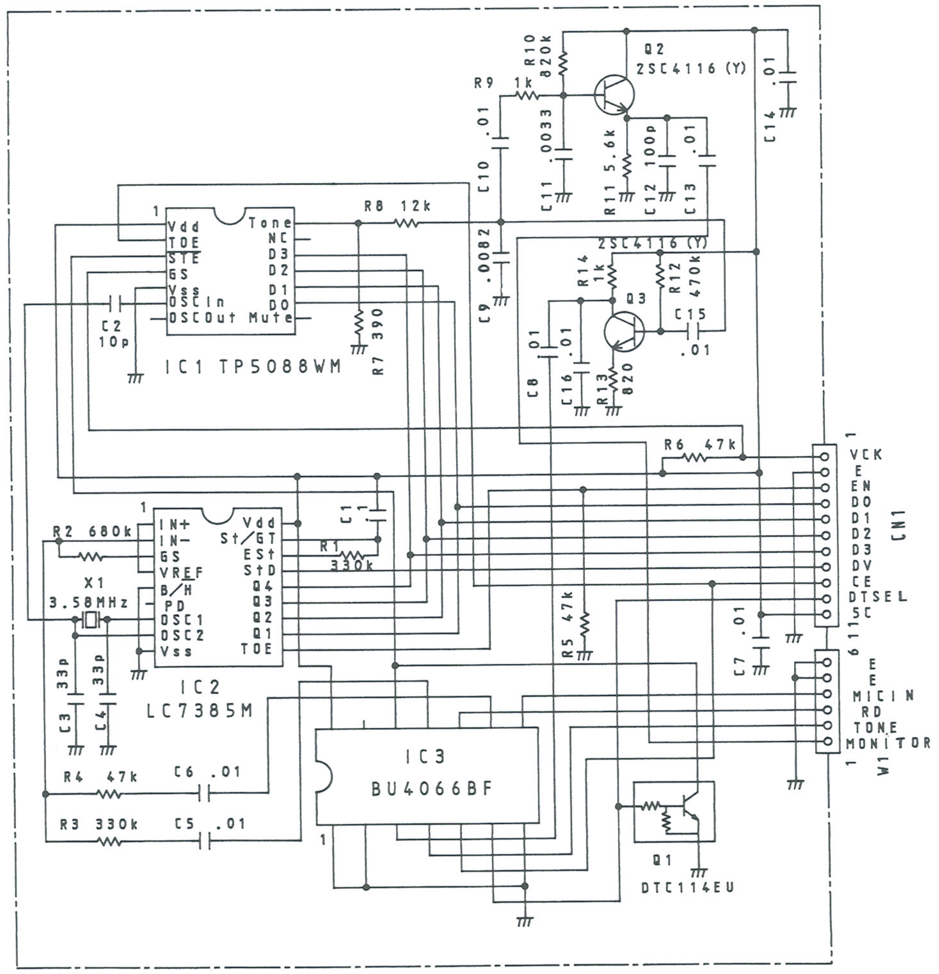

CN1
DTSEL
IC1
IC3
C1
C2
C3
C4
C5
C6
C10
C11
C12
C13
C15
C16
R1
R2
R3
R4
R5
R6
R8
R9
X1
W1
MON
TOE
14
7
1
8
18
10

Foil side view


CN1
VCK
DTSEL
IC1
IC3
C1
C3
C4
C5
C6
C7
C9
C10
C12
C13
C14
R1
R2
R4
R5
R6
R8
X1
W1
MON
14
7
1
8
10

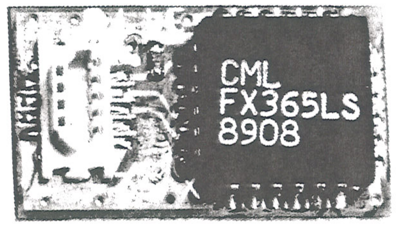
▨ : Component side
▨ : Foil side

DTU-2 CIRCUIT DIAGRAM


R10 820k
Q2 2SC4116 (Y)
R9 1k
C10 .01
C11 .0033
R11 5.6k
C12 100p
C13 .01
C14 .01
R8 12k
1
Vdd
TOE
STE
GS
Vss
OSCIn
OSCOut
Tone
NC
D3
D2
D1
D0
Mute
C2 10p
IC1 TP5088WM
R7 390
C9 .0082
2SC4116 (Y)
R14 1k
R12 470k
Q3
C15 .01
C8 .01
C16 .01
R13 820
R6 47k
VCK
E
EN
D0
D1
D2
D3
DV
CE
DTSEL
SC
CN1
11
6
C1 .1
R2 680k
IN+
IN−
GS
VREF
B/H
PD
OSC1
OSC2
Vss
Vdd
St/GT
ESt
StD
Q4
Q3
Q2
Q1
TOE
R1 330k
X1 3.58MHz
C3 33p
C4 33p
IC2 LC7385M
R5 47k
C7 .01
E
E
MICIN
RD
TONE
MONITOR
W1
R4 47k
C6 .01
R3 330k
C5 .01
IC3 BU4066BF
Q1 DTC114EU

TSU-7 (CTCSS UNIT)

TSU-7 EXTERNAL VIEW

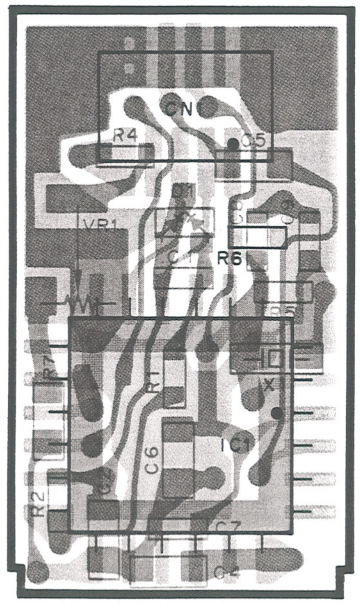

CML
FX365LS
8908

TSU-7 PARTS LIST

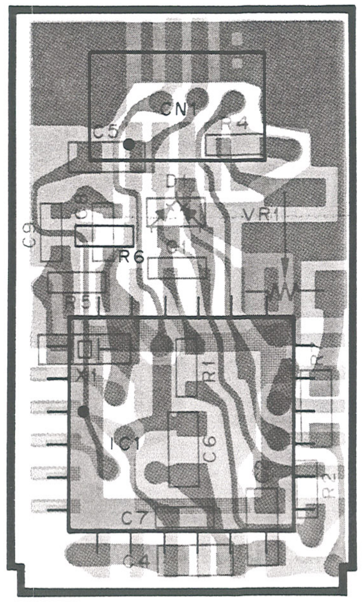
Ref. No	Address	New Parts	Parts No.	Description	Desti-nation	Re-marks
TSU-7 (X52-3170-00)						
			G10-0692-04	CUTTION		
			H21-0704-04	CUTTION		
X1			L78-0062-05	STAL (1MHz)		
IC1			FX365LS	IC		
D1			DAN202U	DIODE		
CN1			E40-5341-05			
VR1			R12-6526-05	TRIM. POT. (47K)		
R1			RK73BG1J274J	CHIP R J 270K		
R2			RK73BG1J824J	CHIP R J 820K		
R4			RK73BF1J103J	CHIP R J 10K		
R5			RK73BG1J105J	CHIP R J 1M		
R6			RK73BG1J473J	CHIP R J 47K		
C1			CK73GB1H471K	CHIP C K 470pF		
C2			C92-0521-05	CHIP TAN 20WV		
C4-6			CK73FB1E104K	CHIP C K 0.1UF		
C7			CK73GB1H471K	CHIP C K 470pF		
C8, 9			CC73GCH1H221J	CHIP C J 220pF		

TSU-7 PC BOARD VIEWS

[Component side view]

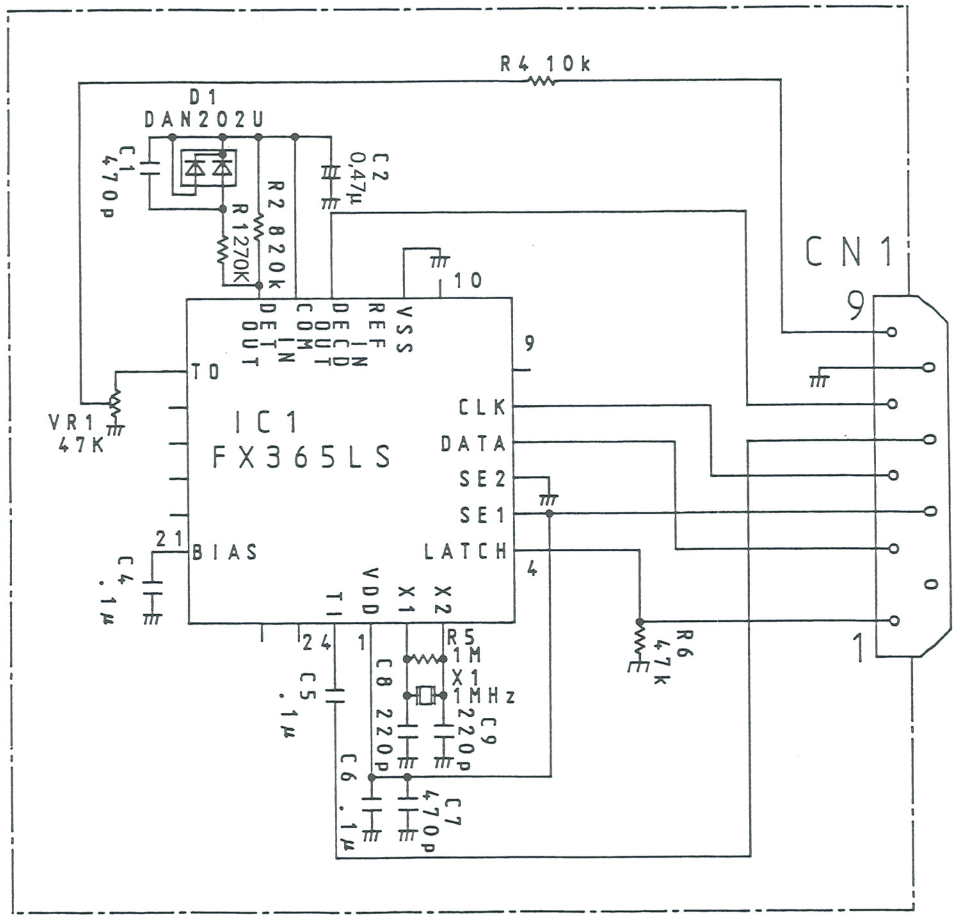

CN1
R4
C5
VR1
R6
R1
X
C6
IC1
R2
C7
C4

[Foil side view]


CN1
C5
R4
C9
VR1
R6
X
R1
IC1
C6
R2
C7
C4

▨ : Component side pattern ▨ : Foil side pattern

TSU-7 CIRCUIT DIAGRAM


R4 10k
D1
DAN202U
C1
470p
C2
0.47μ
R2 820k
R1 270K
CN1
9
1
10
9
DET OUT
COM IN
DEC OUT
REF IN
VSS
TO
VR1
47K
IC1
FX365LS
CLK
DATA
SE2
SE1
LATCH
21
BIAS
4
C4
.1μ
TI
VDD
X1
X2
24
1
R5
1M
X1
1MHz
C5
.1μ
C8 220p
C9
220p
C6 .1μ
C7
470p
R6
47k
TO
E
SDO
RD
CT
4C
DT
NC
ET

MC-45 (MULTI FUNCTION MICROPHONE)

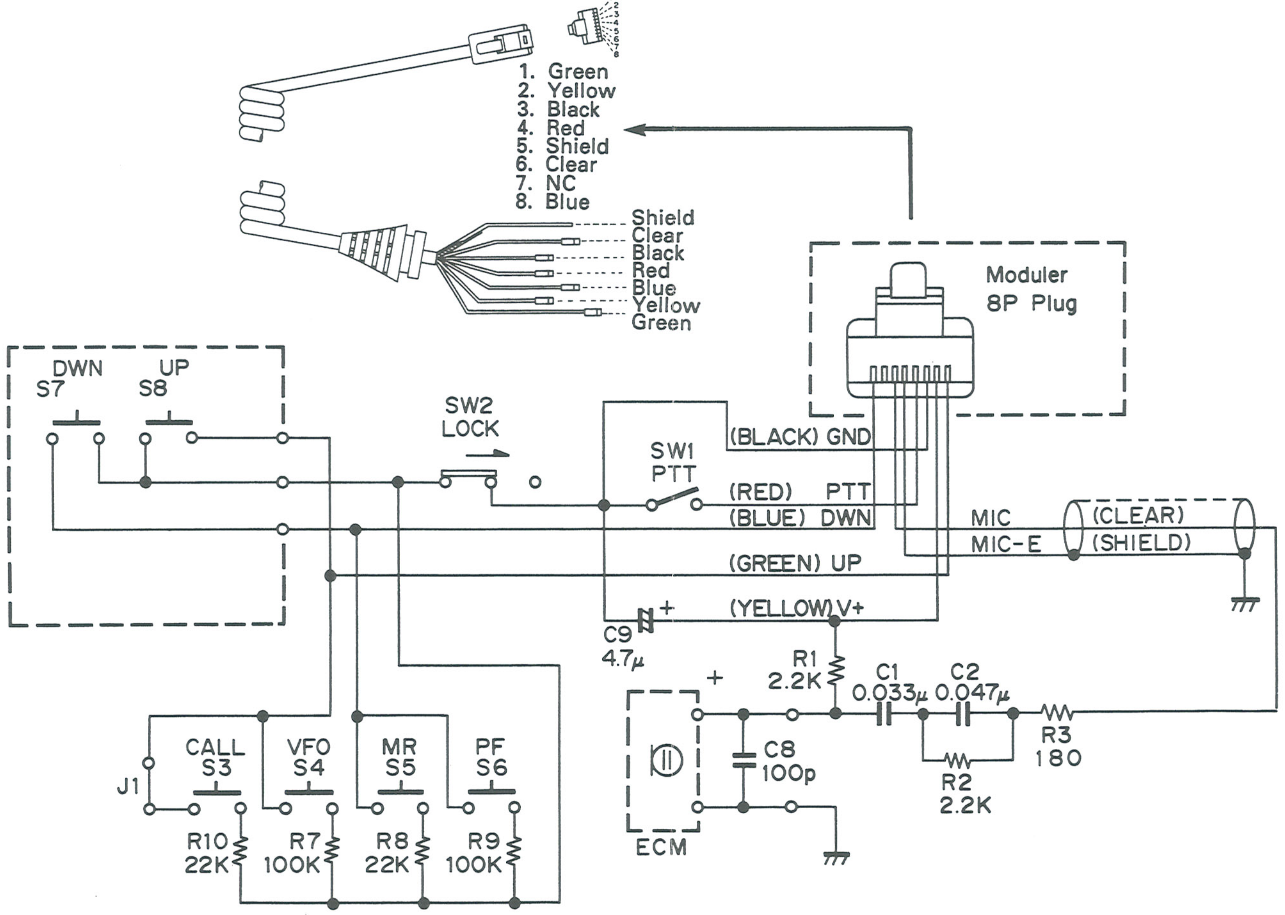
EXTERNAL VIEW

KENWOOD
VFO
MR
PF

PARTS LIST

Ref. No.	Address	New Parts	Parts No.	Description	Desti-nation	Re-marks
			A02-0896-08	CASE (FRONT)		
			A02-0900-08	CASE (REAR)		
			E30-3006-08	CURL CORD ASSY		
			G13-0933-08	CUSHION (UP,DWN)		
			K29-3165-08	KNOB PTT		
			K29-3168-08	KNOB UP		
			K29-3169-08	KNOB DWN		
			K29-3170-08	KNOB CALL,VFO, MR,PF		
			S59-1409-28	SWITCH ASSY UP,DWN		
S3-6			S40-1431-08	TACT SWITCH CALL,VFO, MR,PF		
S7,8			S40-1437-08	TACT SWITCH UP,DWN		
SW1			S50-1431-08	MICRO SWITCH LOCK		
SW2			S31-1422-08	SLIDE SWITCH LOCK		
			T91-0383-08	MICROPHONE ELEMENT		

SCHEMATIC DIAGRAM


1. Green
2. Yellow
3. Black
4. Red
5. Shield
6. Clear
7. NC
8. Blue
Shield
Clear
Black
Red
Blue
Yellow
Green
Moduler
8P Plug
DWN
S7
UP
S8
SW2
LOCK
SW1
PTT
(BLACK) GND
(RED) PTT
(BLUE) DWN
MIC
MIC-E
(CLEAR)
(SHIELD)
(GREEN) UP
(YELLOW) V+
C9
4.7μ
R1
2.2K
C1
0.033μ
C2
0.047μ
R3
180
R2
2.2K
C8
100p
ECM
J1
CALL
S3
VFO
S4
MR
S5
PF
S6
R10
22K
R7
100K
R8
22K
R9
100K

MC-45DM (MULTI FUNCTION MICROPHONE WITH AUTOPATCH)

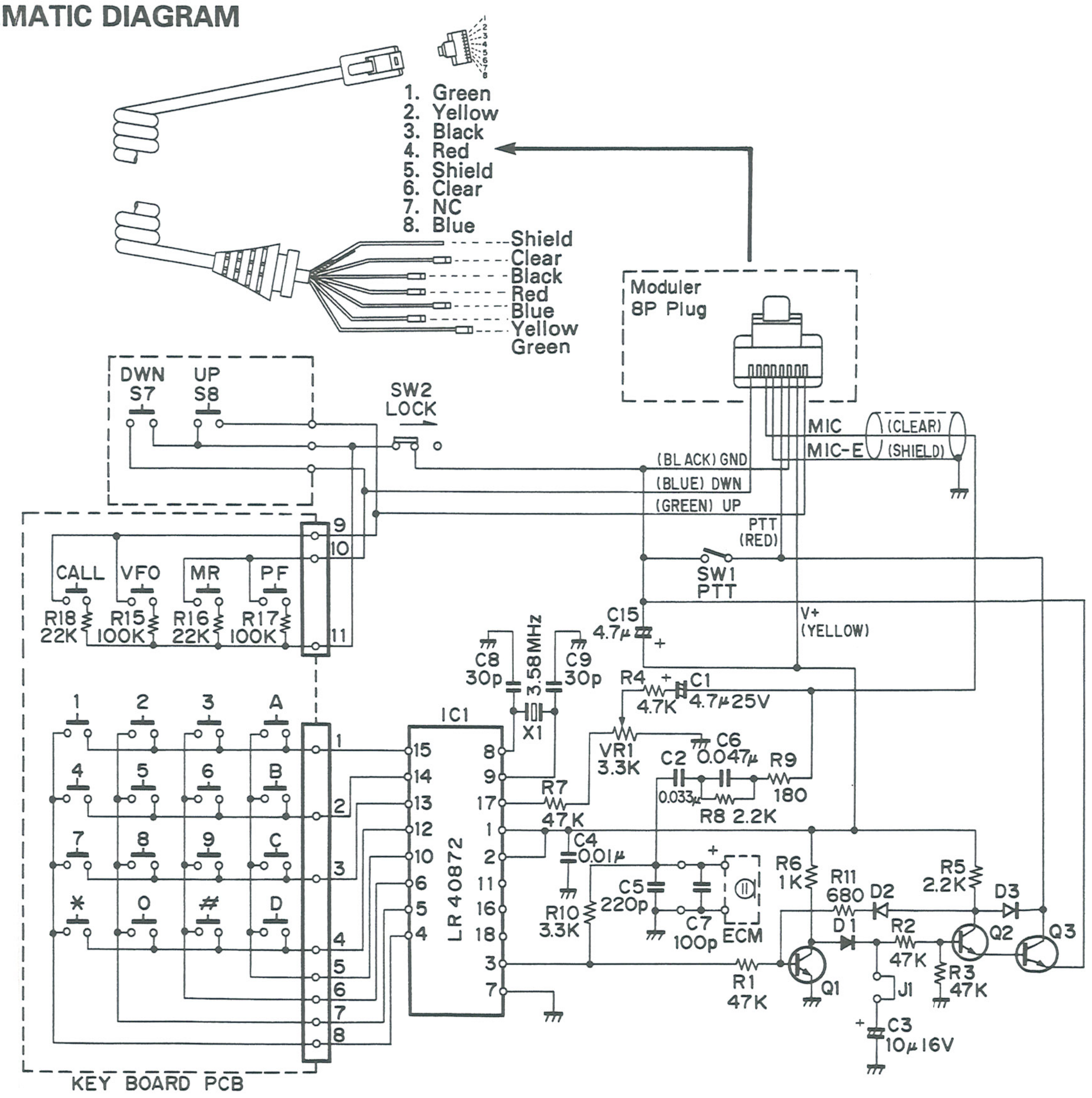
EXTERNAL VIEW

KENWOOD
VFO
MR
PF
1
2
3
A
4
5
6
B
7
8
9
C
*
0
#
D

PARTS LIST

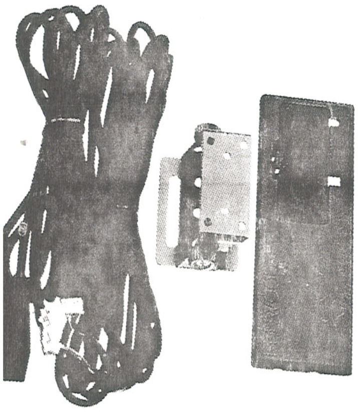
Ref. No.	Address	New Parts	Parts No.	Description	Desti-nation	Re-marks
			A02-0898-08	CASE (FRONT)		
			A02-0901-08	CASE (REAR)		
			E30-3006-08	CURL CORD ASSY		
			G13-0933-08	CUSHION (UP,DWN)		
			K29-3165-08	KNOB PTT		
			K29-3167-08	KEY TOP DTMF		
			K29-3168-18	KNOB UP		
			K29-3169-18	KNOB DOWN		
			S59-1409-28	SWITCH ASSY UP,DWN		
S7,8			S40-1437-08	TACT SWITCH UP,DWN		
SW1			S50-1431-08	MICRO SWITCH PTT		
SW2			S31-1422-08	SLIDE SWITCH LOCK		
			T91-0393-08	MICROPHONE ELEMENT		

SCHEMATIC DIAGRAM


1. Green
2. Yellow
3. Black
4. Red
5. Shield
6. Clear
7. NC
8. Blue
Shield
Clear
Black
Red
Blue
Yellow
Green
Moduler
8P Plug
DWN
S7
UP
S8
SW2
LOCK
MIC
MIC-E
(CLEAR)
(SHIELD)
(BLACK) GND
(BLUE) DWN
(GREEN) UP
PTT
(RED)
SW1
PTT
V+
(YELLOW)
CALL
VFO
MR
PF
R18
22K
R15
100K
R16
22K
R17
100K
C15
4.7μ
C8
30p
3.58MHz
C9
30p
X1
R4
4.7K
C1
4.7μ25V
IC1
LR40872
VR1
3.3K
C6
0.047μ
C2
0.033μ
R9
180
R7
47K
R8 2.2K
C4
0.01μ
C5
220p
C7
100p
ECM
R10
3.3K
R6
1K
R11
680
D2
D1
R5
2.2K
D3
R2
47K
R3
47K
Q1
Q2
Q3
R1
47K
J1
C3
10μ16V
1
2
3
A
4
5
6
B
7
8
9
C
*
0
#
D
KEY BOARD PCB

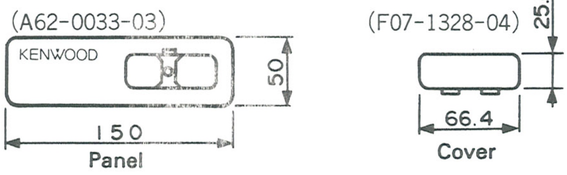
PG-4K/L (PANEL SEPARATE KIT K:4M, L:7M)

G-4K EXTERNAL VIEW

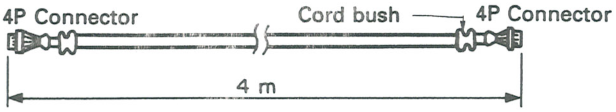


G-4K MAIN EXTERNAL DIMENSIONS

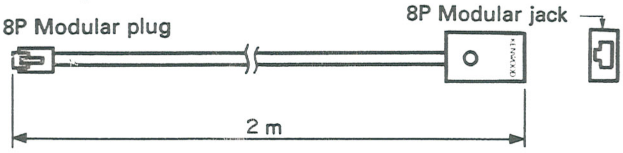
Panel


(A62-0033-03)
KENWOOD
50
150
Panel
(F07-1328-04)
25.4
66.4
Cover

Panel cable (E30-3012-05)

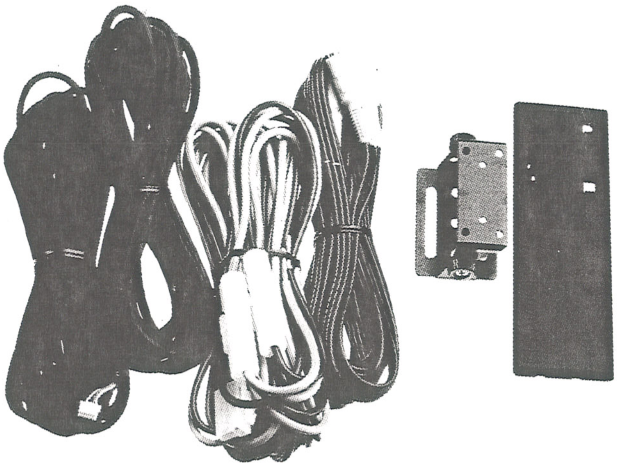

4P Connector
Cord bush
4P Connector
4 m

Microphone cable (E30-3013-05)


8P Modular plug
8P Modular jack
2 m

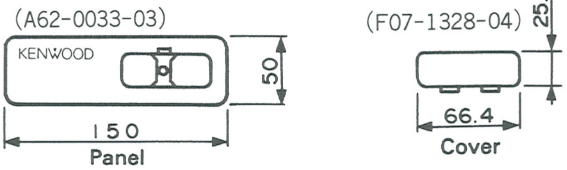
Screw set (N99-0347-05)

PG-4L EXTERNAL VIEW

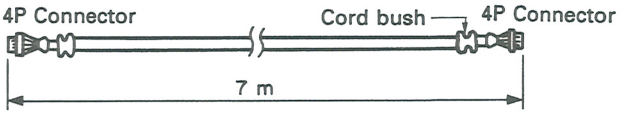


PG-4L MAIN EXTERNAL DIMENSIONS

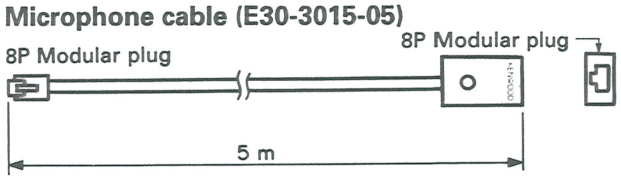
- **Panel**


(A62-0033-03)
KENWOOD
50
150
Panel
(F07-1328-04)
25.4
66.4
Cover

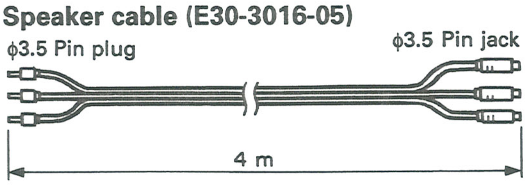
- **Panel cable (E30-3014-05)**


4P Connector
Cord bush
4P Connector
7 m

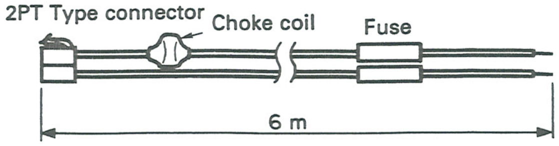
- **Microphone cable (E30-3015-05)**


8P Modular plug
8P Modular plug
5 m

- **Speaker cable (E30-3016-05)**


ϕ3.5 Pin plug
ϕ3.5 Pin jack
4 m

- **DC cord (E30-3032-05)**


2PT Type connector
Choke coil
Fuse
6 m

- **DC cord (N99-0347-05)**

TM-641A/741A/741E

UT-28S/50S/1200 SPECIFICATION

			UT-28S	UT-50S	UT-1200
GENERAL	Frequency range (MHz)		28 ~ 29.7	50 ~ 54	1240 ~ 1300
	Mode		F3(FM)		
	Antenna impedance		50Ω		
	Operating temperature		–20°C ~+60°C		
	Power requirements		DC13.8V ±15% (11.7 ~ 15.8V)		
	Ground		Negative		
	Frequency stability		Less than ±10ppm		Less than ±3ppm
	Current drain	Transmit mode	Less than 11.5A		Less than 6.5A
		Receiver mode	Less than 1.2A		
TRANSMITTER	Output Power	HI	50W		10W
		MID	10W		-
		LOW	Approx. 5W		1W
	Modulation		Reactance modulation		
	Spurious radiation		Less than –60dB (※)		Less than –50dB
	Maximum frequency deviation		±5kHz		
	Audio distortion (at 60% modulation)		Less than 3%		
	Microphone impedance		600Ω		
RECEIVER	Circuitry		Double conversion superheterodyne		
	Intermediate frequency 1st/2nd		8.83MHz	10.595MHz	59.7MHz
			455kHz		
	Sensitivity (12 dB SINAD)		Less than 0.16μV(–16dBμ)		
	Selectivity -6 dB		More than 10kHz	More than 12kHz	
	Selectivity -60 dB		Less than 24kHz		Less than 36kHz
	Squelch sensitivity		Less than 0.1μV(–20dBμ)		
	Output (5% distortion)		More than 2W(8Ω load)		
	External speaker impedance		8Ω		

Notes: 1. Circuit and ratings are subject to change without notice, due to advancements in technology.
2. Recommended duty cycle: 1 minute Transmit, 3 minutes Reception.

(※) Hi Power position: Less than –70dB

SPECIFICATIONS

			144 MHz Band	220 MHz Band	440/430 MHz Band
GENERAL	Frequency range MHz	U.S.A. and Canada	144 ~ 148	220 ~ 225	438 ~ 450
		Other market	144 ~ 148	–	430 ~ 440
		TM-74IE	144 ~ 146	–	430 ~ 440
	Mode		F3E(FM)		
	Antenna impedance		50Ω		
	Operating temperature		–20°C ~ + 60°C (–4°F ~ +140°F)		
	Power requirements		13.8VDC ± 15% (11.7 ~ 15.8V)		
	Ground		Negative		
	Current drain	Transmit mode	Less than 11.5 A	Less than 7.0 A	Less than 10.0 A
		Receiver mode	Less than 1.2 A		
	Frequency stability		± 10ppm		
	Dimensions (WxHxD)		150 x 50 x 175 mm		
	Weight		1.6kg		
TRANSMITTER	Output power	HI	50W	25W	35W
		MID	10W		
		LOW	Approx. 5W		
	Modulation		Reactance modulation		
	Spurious radiation		Less than –60dB		
	Maximum frequency deviation		±5kHz		
	Audio distortion (at 60% modulation)		Less than 3%		
	Microphone impedance		600Ω		
RECEIVER	Circuitry		Double conversion superheterodyne		
	Intermediate frequency 1st/2nd		10.7 MHz/455 kHz	30.825 MHz/455 kHz	21.6 MHz/455 kHz
	Sensitivity (12 dB SINAD)		Less than 0.16μV (–10 dBμ) ※		
	Selectivity -6 dB		More than 12 kHz		
	Selectivity -60 dB		Less than 24 kHz		
	Squelch sensitivity		Less than 0.1 μV (–14 dBμ)		
	Output (5% distortion)		More than 2 W (8Ω load) (5% distortion)		
	External speaker impedance		8Ω		

Notes:
1. Circuit and ratings are subject to change without notice due to advancements in technology.
2. Recommended duty cycle: 1 minute Transmit, 3 minutes Reception.

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